

**Human resources information
system (HRIS)-enabled human
resource management (HRM)
performance: A business
process management (BPM)
perspective**

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Human resources information system (HRIS)-enabled human resource management (HRM) performance: A business process management (BPM) perspective

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Declaration

This thesis is submitted under the University of Salford regulation for the award of PhD degree by research. The work presented was carried out under the supervision of Mr. Andrew Fleming, within the School of Built Environment, University of Salford. Unless otherwise stated in the text, I hereby declare that the work presented in this thesis was the result of my own work. There is no portion of the work covered in this thesis that has been submitted in support of any application for other degree or qualification at this or other institutions of higher learning.



Sinnathamby Sritharakumar

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Abstract

It is widely accepted that business process management (BPM), a contemporary management approach that focuses on managing overall business processes within an organization to accomplish the organizational goal, relies on modern information and communication technology (ICT) systems. The ICT systems that are aligned with BPM are known as BPM systems (BPMS). That said, along with the other key factors, an organization needs to employ an ICT process enabled approach to optimize the BPM outcome. Therefore, this study creates an awareness of the contribution of ICT to BPM by analyzing the linkage between impacts of human resource information systems (HRIS) on human resource management (HRM) performance.

Although there are plenty of academic discussions available on BPM and the firm performance relationship, the literature does not provide constructive information on how the adoption of ICT impacts the BPM performance. As a result, the researcher decided to conduct a study on ‘ICT adoption and BPM performance’, or explicitly, ‘HRIS adoption-HRM performance’ relationship, where HRIS is a form of BPM system and HRM is a sub-domain of BPM.

A conceptual model was developed with strong theoretical background by incorporating the works informed by Lee *et al.* (2012) and Paauwe and Richardson (1997) to test several hypotheses.

By nature, this study is quantitative research that comes under relativist epistemological assumptions and therefore assumes the deductive theory approach. Since the focus of this study (*i.e.* ‘HRIS-enabled HRM performance model’ in view of business process management) is a fairly new area of research that is not found in any existing literature, this author espoused the primary data collection method by employing an online cross-sectional survey design. In this research, the target population is human resources professionals who have access to HRIS within their organizations in a Canadian context.

Data analysis of this research is based on two known approaches, namely, Kendall’s tau-b correlation and ordinal logistic regression (OLR). Although Kendall’s tau-b, unlike other correlations, has an intuitively simple interpretation that employs an algebraic structure, Noether (1981) suggests that Kendall’s tau-b is one of the best approaches to measure the strength of the relationship. Since this study has a wide range of data distribution that tries to

measure the strength of relationship between a HRIS-enabled HR practices and the HRM performance, this researcher has decided to adopt Kendall's tau-b correlation.

Ordinal dependent variables that have natural ordering between their levels, such as Likert scale levels, can be predicted by one or more independent variables using OLR (Kleinbaum and Klein, 2002). In this study, ordinal logistic regression is used to predict the belief that the organization type and organization size impact the HRIS enabled HR practices, namely, transactional, traditional and transformational practices, and the HRM performance.

This study created an awareness of the contribution of ICT on BPM by analyzing the linkage between impacts of HRIS on HRM performance. While the organization type and size, the control variables in this study, do not add any value to the research findings, the important findings of this study are that HRIS-enabled HR transactional, traditional and transformational practices, when implemented appropriately, significantly impact the HRM performance. Specifically, this study confirms that HRIS-enabled HR traditional management practices such as performance management, rewards, career development and communication predominantly significantly impact the HRM performance. That is, the strength of relationship value is larger than typical between the aforementioned HRIS-enabled HR traditional practices and HRM performance. In other words, this study specifically encourages an organization to adopt comprehensive performance management systems (PMS), an important component of HRIS, to manage their employees effectively.

In conclusion, the findings of the studies in this thesis are applicable to organizations that seek improvement to their HRM performance through HRIS-enabled HR practices. Therefore, the organizations that intend to revisit and revamp their business processes related HRM are hereby informed by this study that adopting an appropriate HRIS, specifically a performance management system (PMS) will be critical to their success.

Chapter 1

Introduction

While the demanding nature of the current global economy has placed business process management (BPM) at the centre of effective organization management, information and communication technologies (ICT) have changed the way businesses perform their BPM practices. Therefore, it is widely accepted that business process management (BPM), a contemporary management approach that focuses on managing overall business processes within an organization to accomplish the organizational goal also relies on modern ICT systems. The ICT systems that are aligned with BPM are known as BPM systems (BPMS) (Shaw *et al.*, 2007). That said, along with the other key factors, an organization needs to employ an ICT process enabled approach to maximize its BPM outcome. This study creates an awareness of the contribution of ICT on BPM by analyzing the linkage between impacts of human resource information systems (HRIS) on human resources management (HRM) performance.

Although there are plenty of academic discussions available on the BPM-firm performance relationship, the literature does not provide constructive information on how the adoption of ICT impacts the BPM performance (or in other words, particularly HRM performance in this case). As a result, this researcher would like to emphasize here that this study is not about the impacts of 'BPM-firm performance' relationship, rather it is about the 'ICT adoption-BPM performance' or explicitly 'HRIS adoption-HRM performance' relationship.

1.1 Research questions

That said, this research is poised to find empirical answers to the following research questions:

Research question 1 (RQ1): Does the HRIS-enabled HR practices (namely transactional, traditional and transformational) significantly impact the HRM Performance?

Research question 2 (RQ2): Does the type of an organization significantly impact the HRIS-enabled HRM performance model?

Research question 3 (RQ3): Does the size of an organization significantly impact the HRIS-enabled HRM performance model?

1.2 Aim

The aim of this research is to study the impacts of ‘ICT-enabled business process on BPM performance’, or explicitly ‘HRIS-enabled HR practices on HRM performance’ within Canadian context.

1.3 Objectives

Therefore, this research is focused on, (a) analyzing two theoretical models found in the literature, and (b) adopting those two models to incorporate a new conceptual model that answers the above research question. Hence, the objectives of this research is to develop a conceptual HRIS-enabled HRM performance model that:

- 1) investigates the impacts of the HRIS-enabled HR practices on HRM performance, and
- 2) examines the impacts of organization type and organization size on the HRIS-enabled HRM performance model.

1.4 Scope of the research

In this research, the target study population is restricted to human resource professionals who have access to human resource information systems (HRIS) within their organization in a Canadian context. The reasons for restricting the population and the sample to Canada are:

1. As it was learned from the literature reviews, there is no study involving the Canadian context that addresses ‘HRIS-enabled HRM performance’ from the business process management (BPM) perspective.
2. Since this is a single-researcher study with a strict timeline and resources restriction, data collection is more practical and accessible within a specific context.
3. The researcher is a Canadian citizen who has an extensive work experience and familiarity within the Canadian work settings. Therefore, his level of understanding of the main research constructs such as information communication technologies (ICT) and human resources management within Canadian context is considerably practical and reasonable.

1.5 Hypotheses

In order to find the answers to the three research questions mentioned above, a conceptual model was developed with strong theoretical background by incorporating the works informed by Lee *et al.* (2012) and Paauwe and Richardson (1997) to examine the following five hypotheses:

Null Hypothesis 1 (H1_o): HRIS-enabled HR transactional practices do not significantly impact the HRM Performance.

Alternative Hypothesis 1 (H1): HRIS-enabled HR transactional practices significantly impact the HRM Performance.

Null Hypothesis 2 (H2_o): HRIS-enabled HR traditional practices do not significantly impact the HRM Performance.

Alternative Hypothesis 2 (H2): HRIS-enabled HR traditional practices significantly impact the HRM Performance.

Null Hypothesis 3 (H3_o): HRIS-enabled HR transformational practices do not significantly impact the HRM Performance.

Alternative Hypothesis 3 (H3): HRIS-enabled HR transformational practices significantly impact the HRM Performance.

Null Hypothesis 4 (H4_o): Organization type does not significantly impact the HRIS-enabled HRM performance model.

Hypothesis 4 (H4): Organization type significantly impacts the HRIS-enabled HRM performance model.

Null Hypothesis 5 (H5_o): Organization size does not significantly impact the HRIS-enabled HRM performance model.

Hypothesis 5 (H5): Organization size significantly impacts the HRIS-enabled HRM performance model.

1.6 The conceptual HRIS-enabled HRM performance model

By incorporating the works informed by Lee *et al.* (2012) and Paauwe and Richardson (1997), this research developed a conceptual HRIS-enabled HRM performance model that investigates the main constructs of this research. Figure 1.1 below depicts the big picture of the new conceptual model developed for this study:

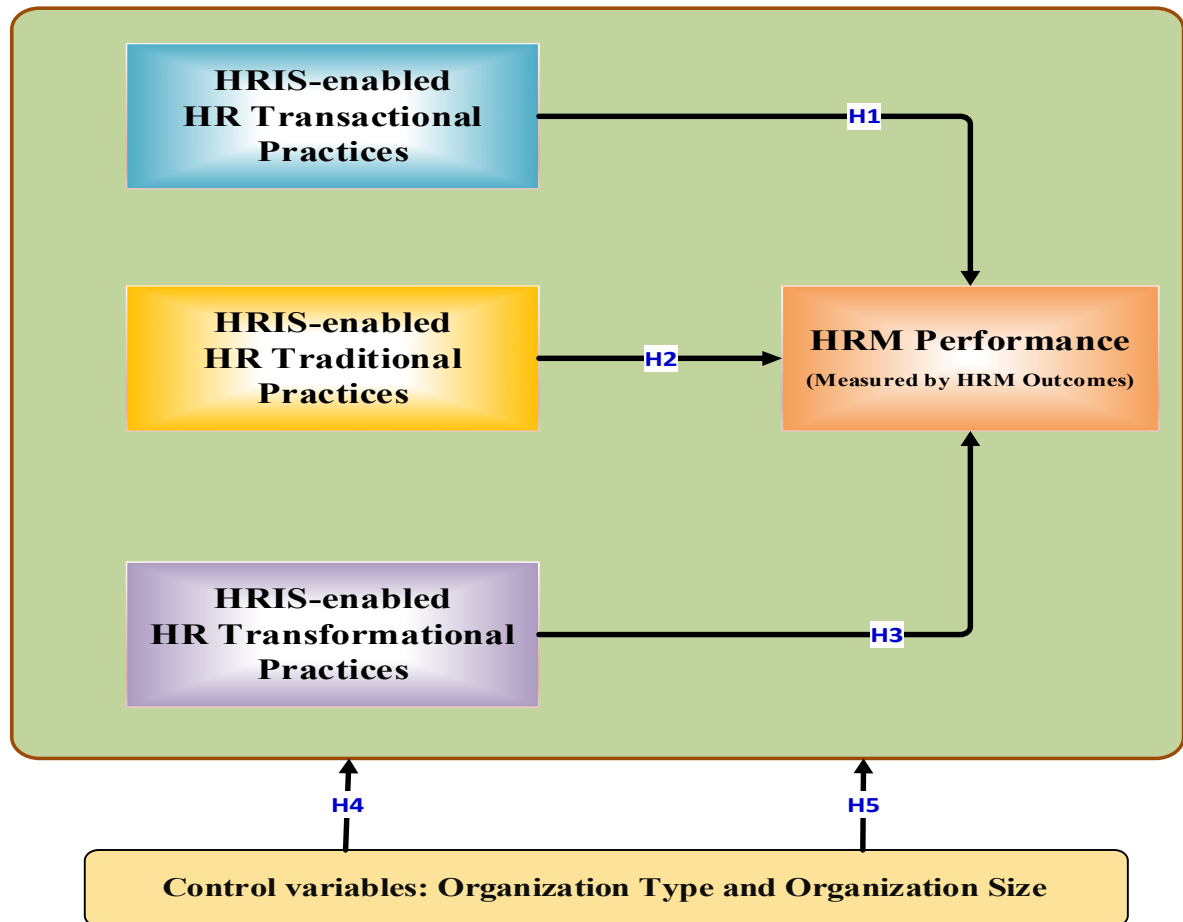


Figure 1.1 - Conceptual HRIS-enabled HRM Performance model

1.7 Research overview

By nature, this study is a quantitative research that comes under the relativist epistemological assumptions and therefore assumed the deductive theory approach. As mentioned earlier, since the focus of this study (*i.e.* 'HRIS-enabled HRM performance model' in view of business process management) is a fairly new area of research that is not found in any existing literature, this author espoused the primary data collection method by employing a cross-sectional survey design. The target population in this research is human resources management professionals who have access to HRIS within their organizations in a Canadian context.

The main focus of this research is to measure the relationship strength between HRIS-enabled HR practices and the HRM performance. Therefore, the following four variables were considered to measure the relationship between HRIS-enabled HR practices and the HRM performance (i.e. the variables of research question 1):

- a) HRIS-enabled HR transactional practices,
- b) HRIS-enabled HR traditional practices,
- c) HRIS-enabled HR transformational practices, and
- d) HRM performance measured by HR outcomes.

In addition, Paauwe and Richardson (1997) maintain organization age, size, type, technology, capital intensity, degree of unionization and industry as the contingency and control variables that may affect the HRM performance. Since this thesis is partially adopting Paauwe and Richardson's (1997) model, a survey questionnaire is designed to collect data on organization type and size, i.e. the two control variables of research questions 2 and 3 respectively.

The survey questions were exclusively designed based on the 'category scales', *i.e.* the questions were both nominal and ordinal. While the screening question, the personal and organization information collection sections were unordered nominal category scale, the hypotheses testing questions were formed based on the Likert scale ordinal category scale.

Data analysis of this research is based on two known approaches, namely, Kendall's tau-b correlation and ordinal logistic regression (OLR). Since Kendall's tau, unlike other correlation, has an intuitively simple interpretation that employs an algebraic structure, Noether (1981) suggests that Kendall's tau is one of the best approaches to measure the strength of the relationship. Since this study has a wide range of data distribution that tries to measure the strength of relationship between a HRIS-enabled HR practices and the HRM performance, this researcher has decided to adopt Kendall's tau-b correlation.

Ordinal dependent variables that have natural ordering between their levels, such as Likert scale levels, can be predicted by one or more independent variables using OLR (Kleinbaum and Klein, 2002). In this study, ordinal logistic regression is used to predict the belief that the organization type and organization size impact the HRIS enabled HR practices, namely, transactional, traditional and transformational practices, and the HRM performance.

This thesis is organized from the general to the specific. Chapter 2 of this report begins with a broad literature review on BPM concepts and Chapter 3 conducts a specific literature review on HRM aspects to connect HRM to BPM and HRIS to ICT. Next, Chapter 4 discusses the

theoretical background of this research by analyzing theories of Lee *et al.* (2012) and Paauwe and Richardson (1997). Chapter 5, on research methodology, discusses the research design process and then the deductive theory approach in detail and the two data analysis approaches used in this research, namely, Kendall's tau-b correlation and ordinal logistic regression (OLR). Chapters 6, 7 and 8 are focussed on research methods; specifically, Chapter 6, on 'Subjects', focusses on detailed information about the sampling method that is used in this research, as well as the rationale for this choice, Chapter 7, on 'Measures', describes the data gathering design adopted in this study by focusing on the survey design, instrumentation, and the questionnaire design, and Chapter 8, on 'Procedures', details all the steps pertinent to data collection and analysis. With the methodology fully described, Chapter 9 follows and is the first of two data analysis sections, investigating the relationship between HRIS-enabled HR practices and HRM performances. Next, Chapter 10 examines the impacts of organization type and size on HRIS-enabled HRM performances model. Finally, Chapter 11 draws conclusions about the initial research questions based on the work conducted in this thesis and identifies the limitations of this study to make recommendations for future researchers who wish to conduct studies in the area of BPM.

Chapter 2

Business process management (BPM) - A broad review

The purpose of this chapter is to review the literature associated with the business process management (BPM) definitions, history, and concepts that subsequently can satisfy the hypotheses constructs and answer the research question.

2.1 Business process management (BPM)

The demanding nature of the current global economy has placed BPM at the centre of effective organization management. BPM is a management system that governs business processes and conducts a set of coordinated tasks and activities within an organization to accomplish a specific organizational goal (Neubauer, 2009).

2.1.1 Definition of BPM

BPM is a management philosophy focused on managing overall business processes within an organization to accomplish the organizational goal. Gersch *et al.* (2011) maintain that BPM is a general approach that uses process as the core concept to understand and control business activities. Hegedus (2008) for his part further elaborates that BPM is often introduced as a totally different way of managing business through the definition of management and ongoing improvement of its processes. More specifically Weske *et al.* (2004, p.2) define BPM as the lifecycle approach that supports:

Business processes using methods, techniques, and software to design, enact, control, and analyze operational processes involving humans, organizations, applications, documents and other sources of information.

Taking a step further, Houy *et al.* (2010) contemplate that by practicing BPM, an organization can realize its goal-oriented management of business processes and the achievement of strategic and operative objectives. By the same token, Doebeli *et al.* (2011, p.184) emphasize that BPM is a “*process-centric organizational management philosophy*” that “*provides organisations with a means of increasing competitiveness and sustainability in times of market uncertainty, increasing globalisation and constantly changing business conditions*”.

While BPM definitions by Gersch *et al.* (2011), Hegedus (2008), Weske *et al.* (2004), Houy *et al.* (2010) and Doebeli *et al.* (2011) echo the intrinsic values of an organization, Zari (1997)

broadens the definition to ensure that BPM not only supports the business processes, strategic and operative objectives of an organization, but also focuses and delivers on customer satisfaction. Zari (1997, p.78) says:

BPM is an approach which is all-encompassing and is dependent on strategic elements, operational elements, use of modern tools and techniques, people involvement and, more importantly, on a horizontal focus which will best suit and deliver customer requirements in an optimum and satisfactory way.

Collectively, the above descriptions and definitions of BPM by Gersch *et al.* (2011), Hegedus (2008), Weske *et al.* (2004), Houy *et al.* (2010), Doebeli *et al.* (2011) and Zari (1997) highlight the BPM terms that are cited in the work done by Doebeli *et al.* (2011). Acknowledging the previous works by DeBruin and Doebeli (2009a, and 2009b), in their paper Doebeli *et al.* (2011, p.185) identify the most common interpretations of BPM as:

- *BPM as a solution for a business using software systems or technology to automate and manage processes;*
- *BPM as a broader approach to managing and improving processes that focus on the process lifecycle; and*
- *BPM as an approach to managing an organisation by taking a process-view.*

While recognizing the above BPM terms, Doebeli *et al.* (2011) also raise the flag to alert the academic circle and argue that as a result of varying interpretations of the BPM there are two underlying concerns about BPM:

1. There is no common mechanism that facilitates an organization to implement and progress the practice of BPM.
2. There is little theory in literature to assist organizations in embedding BPM across an organization.

In order to overcome this dilemma, in their work Doebeli *et al.* (2011) identify and suggest BPM governance as one of the key factors that needs to be in place to enable process orientation. While agreeing with the BPM governance concept, author of this research is inclined to argue that in addition to a common BPM governance, a mechanism that ensures the alignment of business processes along with the information communication technology (ICT) processes must be in place to evaluate the effective BPM. That said, along with the other key factors, an organization needs to employ an ICT process enabled approach to maximize its BPM outcome.

The Chapter 3 of this thesis will discuss such an ICT-enabled BPM conceptual model which employs human resource information system (HRIS) and human resources management (HRM).

2.1.2 History of BPM

Snabe *et al.* (2008) maintain that the dated ideas underlying BPM have already been elaborated and thereupon extended, based on current business ideas and available technology. Therefore, analysing the origin and evolution of process management is integral to understanding the BPM concept.

The history of BPM is long and rich, confirms Smith (2006), who expounds that historically BPM has taken up three sets of 'waves' in its lifetime. The roots of BPM can be traced back to Frederick Taylor's theories of management science in the 1920s and Carl Barth's machining slide rule technology in the industrial age (Smith, 2006). Throughout the first wave, BPM became a business driver in the early information age between 1970s and 1980s (Lusk *et al.*, 2005). In the second wave occurring in the 1990s, industrial processes were reengineered and fitted into packaged enterprise applications technology (Smith, 2006; Lusk *et al.*, 2005; Hammer and Champy, 2001). In the third wave of BPM, extending from 2000, executable digitized processes were freed from their former image as engrained software to re-emerge as an adaptable new form of process data (Smith, 2006; Snabe *et al.* 2008; Lusk *et al.*, 2005).

After its lengthy journey, Houy *et al.* (2010) consider that BPM actually has reached its maturity. They argue that the amount of currently available literature concerning BPM, the existence of noteworthy Business Process Management Journal with SJR indicator of 0,6 (SCImago Journal & Country Rank, 2013), continuously ongoing international conferences in BPM and the institutionalization of degree programs specializing in BPM at several universities are strong evidence that BPM is no longer considered a temporary trend or fad but a major approach in management science.

Throughout its evolution, the BPM concept has adopted several names, such as Business Process Improvement (BPI) (Harrington, 1991), Business Process Re-engineering (BPR) (Davenport, 1993), Workflow Management (WfM) (van der Aalst, 1998), Business Process Modelling, (Tam, Chu and Sculli, 2001), Total Quality Management (TQM) (Muehlen and Ho, 2005), and Business Process Change (BPC) (Motwani, Prasad and Tata, 2005). These changes were not only name changes but redefined and contributed new values to the concept of BPM. Smith (2006. p.1) endorses this as, "*Each era of BPM has added new capabilities to its*

antecedents”. In support of Smith’s (2006) statement, Rosemann, *et al.* (2004, p.1) maintain that:

Business Process Management (BPM) consolidates objectives and methodologies, which have been proposed in a number of approaches including Business Process Reengineering, Business Process Innovation, Business Process Modelling and Business Process Automation/Workflow Management.

Mindful of these new capabilities to add value to the undertaken research, the next section of this paper discusses the related topics of business process management, which include business processes, TQM, WfM, BPR, BPI, BPM cycle, BPM maturity, and BPM systems (BPMS).

2.2 Related topics and works of BPM

2.2.1 Process vs. business process

A process is a series of interrelated activities that creates an end result to the betterment of a situation. According to van der Aalst and van Hee (2009), a process indicates which tasks must be performed and in what order to successfully complete a case, therefore a process technically consists a set of tasks, conditions, and sub processes.

Supplementing value to the above definition, Muller (2013, p.1) quotes the definition of process from a book called *Method Integration; Concepts and Case Studies*, written by Klaus Kronl f (1993) as:

A process is an activity which takes place over time and which has a precise aim regarding the result to be achieved. The concept of a process is hierarchical which means that a process may consist of a partially ordered set of sub processes.

Drawing from the above quotation, Muller (2013, p.2) then extends the definition of a process by categorizing it through five attributes: ‘Purpose’ (goal to be achieved and why), ‘Structure’ (how the goal will be achieved), ‘Rationale’ (reasoning behind this process), ‘Roles’ (roles that are present and associated responsibilities; incentives that are present and the criteria for these roles) and ‘Ordering’ (phasing or sequence that is applied).

Ittner and Larcker (1997, p.523), while agreeing with the above concepts, alternatively relate the process to the business aspects, stating that a “*process is a set of activities that, taken*

together, produce a result of value to a customer”. Davenport (1994, p.134) confirms Ittner and Larcker’s (1997) statement, and further explicates:

A process is simply structured set of activities designed to produce a specified output for a particular customer or market. It has a beginning, an end, and clearly identified inputs and outputs. A process is therefore a structure for action, for how work is done. Processes also have performance dimensions - cost, time, output quality, and customer satisfaction that can be measured and improved.

Hammer and Champy (2001), two prominent advocates of BPR, for their part, define a process as a collection of activities that intakes one or more inputs to deliver an output that is of value to the customer.

The definitions of a process by Ittner and Larcker (1997), Davenport (1994), and Hammer and Champy (2001) clearly take the notion of a process into the next level of understanding, known as ‘business processes’. When a process within an organization becomes a customer centric activity that creates value for both the organization and the customer, then it can be considered as a business process (Georgakopoulos and Hornick, 1995; Harrington, 1991).

Pointing to the views of Keen and Knapp (1996) in their book, *Every Manager’s Guide to Business Processes: a Glossary of Key Terms and Concepts for Today’s Business Leaders*, Goldkuhl and Lind (2008) stress that there are two views of business processes: the first one is the ‘transformative view’ that considers “process as workflow”, where input (raw material) is transformed into output (finished product). The second one is the ‘coordinative view’ that considers “process as the coordination of work”, where coordination, agreements and commitments are emphasised.

The transformative view on business processes analysis is supported by the major process management concepts of TQM, BPR and BPM (Goldkuhl and Lind, 2008). On the other hand, the significance of the coordinative view on business processes is that it identifies blind spots in the transformative view and explicitly recognizes the communicative acts governing business processes (Lind, 2006). Goldkuhl and Lind (2008) and Lind (2006) agree that the transformative and coordinative views on business processes both possess a strictly horizontal view on organizations, and the vertical aspects such as power and authority are usually ignored.

(In addition to the above definitions, there are a number of non-academic and non-business related definitions that bestow various meanings to a process. Since these definitions are not within the scope of this study, they are not taken into the consideration.)

2.2.2 Total quality management (TQM)

TQM is an integrated management philosophy that views organizations as systems of interlinked processes (Ravichandran and Rai, 2000). “*TQM is a management strategy aimed at embedding awareness of quality in all organizational processes*” acknowledges Snabe *et al.* (2008, p.37). These two definitions are holistic in nature and therefore emphasize managing the quality on overall organizational processes.

However, limiting the definition of TQM to business processes, Lind (2006) asserts that the concept of TQM contributes to the aforementioned ‘transformative view’ on business processes: as an integrated form of “management philosophy”, TQM coordinates people, business processes and systems of an organization to achieve complete customer satisfaction at every stage, internally and externally (Department of Trade and Industry, 2009).

TQM has its roots in the postwar Japanese economic developments (Powell, 1995), and during the 1980’s TQM became a popular management approach that encouraged incremental process improvements in manufacturing and service-oriented organizations (Gunasekaran and Nath, 1997).

Following World War II, in the late 1940s and early 1950s, Japan was desperate to improve its economy. However, this outlook for Japan was completely changed in the subsequent three decades; by the 1980s, Japan was one of the richest nations in the world. One of the main reasons for Japan’s successful economic transformation was credited to the effective implementation of TQM (Hames, 1991). By observing the success story of Japan, Western countries have since realized (from the 1980s) that quality is the basis for competition, thus validating the importance of TQM and resulting in the implementation of TQM concepts in their organizations (Hellsten and Klefsjö, 2000).

Hellsten and Klefsjö (2000) maintain that TQM is a continuously evolving management system consisting of three interdependent components: core values, techniques, and tools. In particular, continuous improvement (a core value), process management (a technique), and process mapping (a TQM tool), have successfully aligned with the concepts of workflow management (WfM) (van der Aalst, 1998) and modern BPM (Muehlen and Ho, 2005). In specific, Lusk *et*

al. (2005) link TQM to the first wave of BPM that took place in the information age between the 1970s and 1980s.

2.2.3 Workflow management (WfM)

The Workflow Management Coalition (WfMC, 1999, p.8) defines workflow as:

The automation of a business process, in whole or part, during which documents, information or tasks are passed from one participant to another for action, according to a set of procedural rules.

Moreover, Lind (2006), while agreeing with the WfMC's definition of WfM, concedes that a business process is often seen to consist of sequential sub-processes or activities; and therefore the transformative business process view emphasizes the ordering of activities in the workflow, as discussed earlier in section 2.2.1.

While agreeing that automation of business processes is central to the WfM, zur Muehlen (2004) contends that WfM systems are nothing but BPM systems. Weske *et al.* (2004) further echo the same sentiment and consider BPM as the next step of WfM. Caverlee *et al.* (2007, p. 61), for their part, confirm that, "*Workflow management is the most widely accepted implementation of business process management and a critical component for successful enterprise transformation*".

By contrast, Georgakopoulos and Hornick (1995), consider the workflow concept as being closely attributed to business process reengineering (BPR) and the automation of the business process in an organization. The key point seen here is that even though BPR and BPM are not exactly the same (BPR and BPM will be further differentiated in the next section), the concept of WfM is the common underpinning to both BPR and BPM.

2.2.4 Business process re-engineering/re-design (BPR)

In the late 1980's and early 1990's the rapidly changing global economy pressured many organizations to become extensively dynamic and customer-centric. As a result, organizations started to revamp their old management practices by completely reengineering or redesigning their business processes (Misra *et al.*, 2008). Hammer (1990), one of the known BPR gurus, promotes BPR as:

Reengineering strives to break away from the old rules about how we organize and conduct business. It involves recognizing and rejecting some of

them and then finding imaginative new ways to accomplish work. From (our) redesigned processes, new rules will emerge that fit the times.

In their book '*Reengineering the corporation: a manifesto for business revolution*' Hammer and Champy (2001, p.35) define "*Reengineering [as] the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical, contemporary measures of performance, such as cost, quality, service, and speed*". In a nutshell, Hammer and Champy (2001, p.52) put this definition in two words and say, "*Starting over*"; starting over all business processes, so that an organization takes up a new 'avatar'.

By the same token, Hegedus (2008) emphasizes that BPR is all about *starting over* an organization's key processes by having information communication technology (ICT) as the key enabler for its change management strategy. In the same fashion, Gunasekaran and Nath (1997, p. 92) admit that, "*The IT has played a vital role in the success of the overall reengineering initiatives*".

However, while agreeing that ICT plays a crucial role in BPR, Hammer and Champy (2001) insist that BPR is neither the automation of existing business processes with the help of ICT, nor software reengineering, which means recreating outdated business processes with the help of latest technology. Hammer and Champy (2001, p. 89) argue that, "*Reengineering, unlike automation, is about innovation. It is about exploiting the latest capabilities of technology to achieve entirely new goals*". They also believe that organizations observing ICT through the lens of existing processes is one of the fundamental errors that could eventually lead to the failure of BPR in that organization (p. 89).

Somewhat contradictory to the stringent perception of Hammer and Champy on BPR, Chan and Land (1999) admit that ICT as an enabler of BPR for radical changes needs to be mindful of incorporating the existing processes to the proposed processes. In other words, Chan and Land (1999) advocate that even though BPR is all about '*starting over*' the business processes using ICT as an enabler, organizations should be mindful of existing processes, and in certain situations, retaining the existing critical and value-added processes.

Although BPR and BPM exclusively deal with business processes, one should not simply interchange the word BPR with BPM; Ko, *et al.* (2009) argue that BPR and BPM are not the same. They argue that (p.748): "... *whereas BPR calls for a radical obliteration of existing business processes, its descendant BPM is more practical, iterative and incremental in fine-tuning business processes*". Bucher and Winter (2009), however, consider that BPR is nothing but typically one of the BPM methods that supports the overall BPM approach. Considering

these opinions, one can say that BPR gives way to BPM, a management philosophy focused on managing overall business processes.

As said earlier, BPM focuses on managing overall business processes incrementally and continuously within an organization to accomplish the organizational goal by accommodating people, technology and information. That is to say, BPM is not merely the reengineering or redesigning of the business processes, but actually a continuous management approach that oversee the continuous business process improvement (BPI).

2.2.5 Business process improvement (BPI)

In recent years, business process improvement (BPI) has gained popularity among the business communities as an important aspect for meeting the challenges of ever growing competition and customer needs. BPI is an approach that is widely practiced by organizations to keep up the business processes intact with the changing nature of business circumstances, such as growing global competition, customer expectations, new technologies, marketing strategies, governance, *etc.* (Adesola and Baines, 2005).

While Siha and Saad (2008) consider that six sigma, benchmarking, BPR, and process mapping are the four major approaches to improve business processes, Adesola and Baines (2005) alternatively argue that BPI is slightly different from BPR. Adesola and Baines perceive that BPR is usually associated with much more of radical changes to the business processes, whereas BPI is a methodology that brings step-function improvements in administrative and support processes using benchmarking and BPR.

Considering the advancement of BPI and the current business trend, Hegedus (2008) is inclined to align BPI to the concept of BPM. Hegedus (2008) advocates that BPM and BPI are closely linked; therefore need to be managed tightly if the focus on processes is to have significant and sustained positive impact on business performance. Hegedus (2008) maintains that BPM is the way in which an organization '*manages*' its business through focusing on its processes and BPI is the way in which an organization '*improves*' business through focusing on its processes. On this basis, Hegedus (2008) charts the specific focuses of BPM and BPI as follows:

Table 2.1 - Characteristics – BPM vs. BPI

BPM	BPI
Business	Projects
Processes	Problems
Proactive	Reactive
Long Term	Short Term
Strategic	Operational
Business Wide	Process Specific
Knowledge	Facts And Data
Organic	Mechanistic

Referring to a survey of Northern Ireland’s “Top 100” companies conducted in 1998 by France M. Hill and Lee K. Collins, McAdam and McCormack (2001, p.115) identify three states of competitiveness that coerce managers to rigorously consider and then implement BPI:

1. *a company in crisis,*
2. *a company in a strong competitive position, but envisaging greater competition in the future; and*
3. *a company in a strong position, and wanting to capitalize on that position*

As is seen above, the survey ostensibly shows that regardless of their current situation, many companies want to improve their business processes to stay ahead of the competition.

Despite the fact that nearly all major organizations around the globe are striving to improve their business processes to sustain profitability, not all of these efforts are successful (Adesola and Baines, 2005). Hegedus (2008) maintains that the failure occurs when BPI and BPM were not strategically integrated.

Given the points of Adesola and Baines (2005) and Hegedus (2008), one can understand that continuous business process improvement is one of the key success factors of BPM. “*This continuous improvement of business processes is typically conceptualized by a BPM lifecycle*”, claim Houy *et al.* (2010, p.621).

2.2.6 BPM Lifecycle

The business process management (BPM) lifecycle provides an overall understanding of the concepts and technologies that are associated with BPM (Weske, 2007). The BPM lifecycle

consists of four phases, namely: Design & Analysis, Configuration, Enactment and Evaluation (van der Aalst, 2004, p.137; Weske, 2007, p.12).

van der Aalst (2004), a well-known expert of workflow management (WfM) and BPM, establishes the relationship with workflow management (WfM) and BPM. In terms of lifecycles approach, Figure 2.1, below depicts the relationship between BPM and WfM that was developed by van der Aalst (2004, p.138):

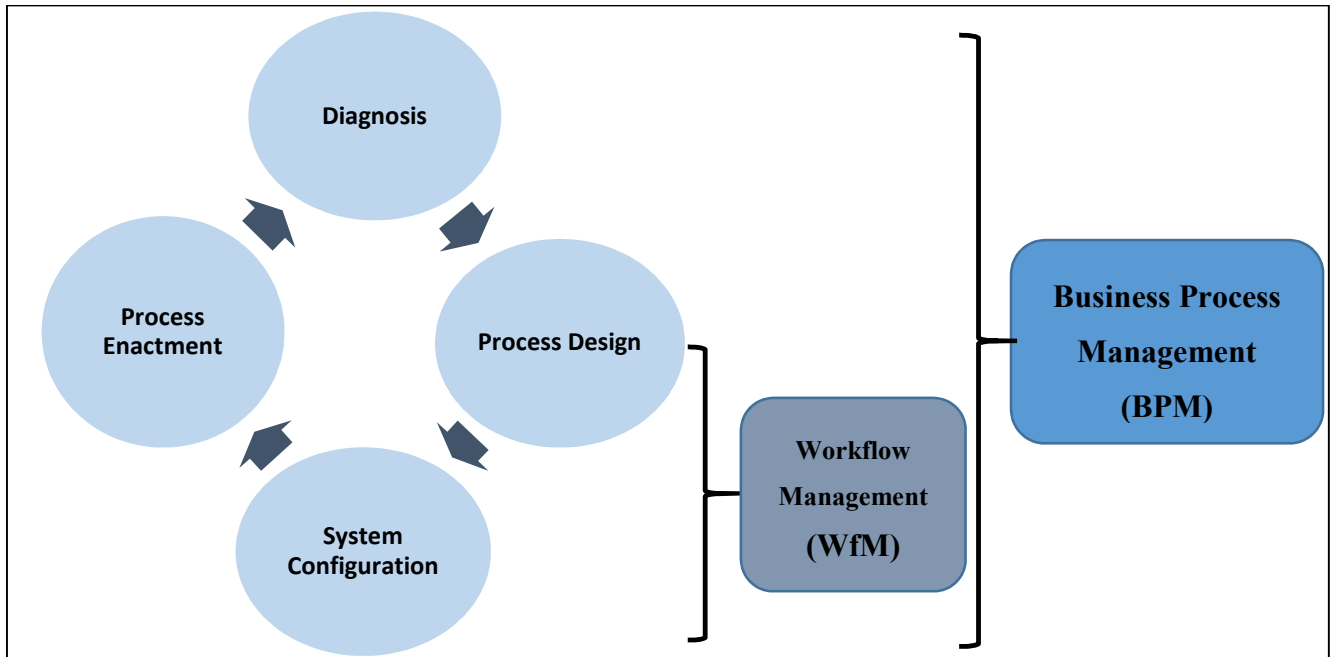


Figure 2.1 - Relationship between BPM and WfM (by van der Aalst, 2004)

As is seen above, WfM takes place in the lower-half of the BPM lifecycle, in that the evaluation or diagnosis phase is omitted. This is because, as van der Aalst (2004) puts it, the traditional WfM does not offer tools for evaluation or diagnosis of business process flows. This comparison concludes that BPM is a superior process management approach than the WfM (Ko, *et al.*, 2009).

Weske (2007, p.12) depicts the BPM lifecycle in Figure 2.2 by combining the work of van der Aalst (2004, p.138). According to van der Aalst and Weske, the BPM lifecycle starts at ‘Design & Analysis’ phase and rotates clockwise to the end at the ‘Diagnosis or Evaluation’ phase. Explaining further, van der Aalst (2004, p.137) says:

1. In the **design** phase, the processes are (re)designed.
2. In the **configuration** phase, designs are implemented by configuring a process aware information system (e.g., a WfM system or a BPM system).

3. The **enactment** phase starts where the operational business processes are executed using the system configured. (van der Aalst, elucidates that this phase as the use of software to support the execution of operational processes and emphasizes that is the main focus of WfM).
4. In the **diagnosis** phase, the operational processes are analyzed to identify problems and to find things that can be improved.

At the end of the 'Evaluation' phase the cycle may re-enter into the 'Design & Analysis' phase so that the continuous process improvement is ensured.

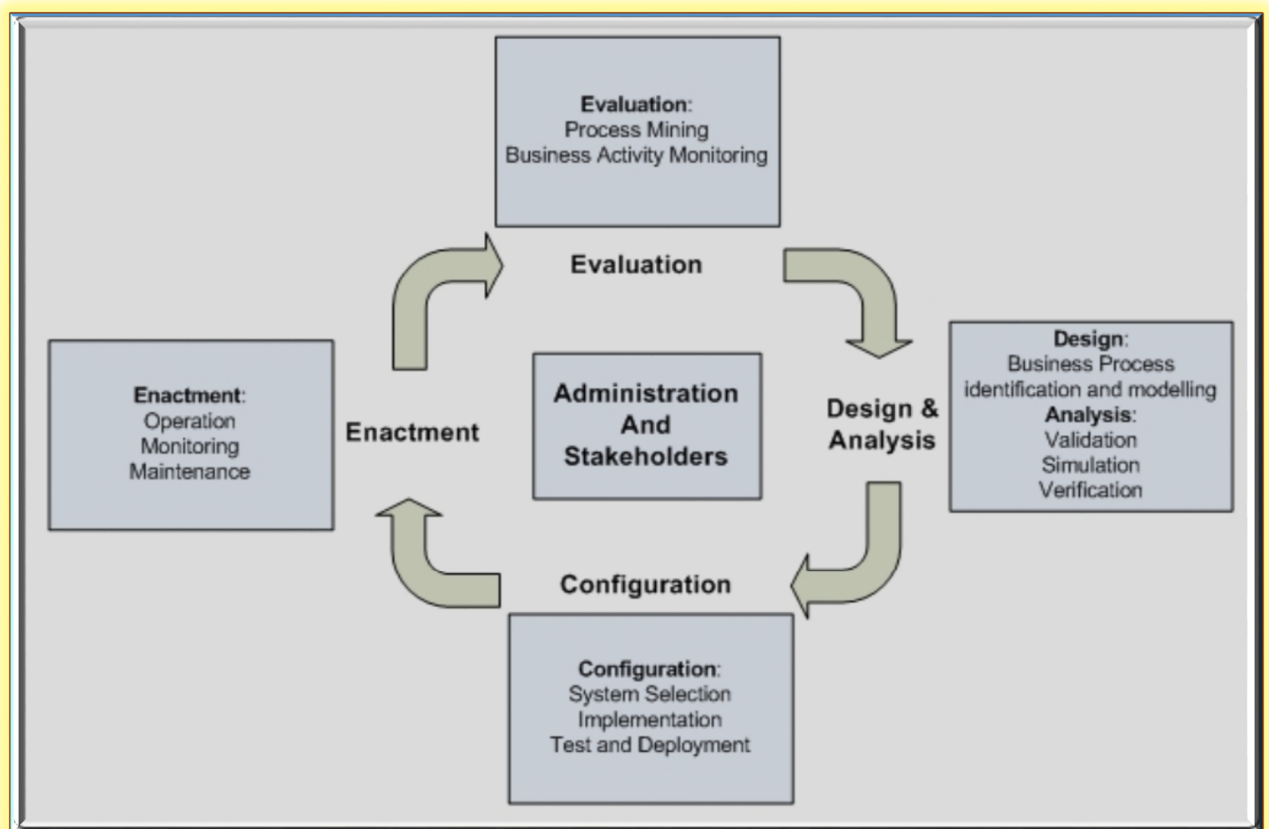


Figure 2.2 - BPM lifecycle (by Weske, 2007)

Filipowska *et al.* (2009) inform that, although BPM experts consider that there is a lack of reliable holistic approach that guides BPM projects end-to-end, there are several BPM approaches that follow Weske's BPM lifecycle to offer BPM tools and techniques.

While conceptually in agreement with van der Aalst (2004), Weske (2007) and Ko, *et al.*, (2009), Lockamy III and McCormack (2004) extend their view on process lifecycle to adopt the notion of process maturity. Lockamy III and McCormack (2004, p.275) put it as:

This concept [process maturity] proposes that a process has a lifecycle that is assessed by the extent to which the process is explicitly defined, managed, measured and controlled.

Taking the lead from Lockamy III and McCormack (2004), the next section will look into the concept of BPM maturity.

2.2.7 BPM Maturity

As has been seen so far in this paper, the evidence indicates that BPM has become one of the mainstays of management practices. As a result, the business processes are now treated as assets requiring investment and development as they mature, therefore, the awareness of process maturity is also becomes significant (McCormack, *et al.*, 2009). For their part, Lockamy III and McCormack (2004, p.272) acknowledge that: *“the concept of process maturity is becoming increasingly important as firms adopt a process view of the organization”*.

The term ‘maturity’ in management approaches is projected as a method to evaluate ‘the state of being complete, perfect, or ready’ (Rosemann, *et al.*, 2004). A process maturity, therefore, is achieved when the process goes through its lifecycle and meets its set goals. However, what needs to be distinguished here is the understanding that BPM maturity is not merely a business process maturity. Since BPM is a management approach that can realize an organization’s goal-oriented management of business processes and the achievement of strategic and operative objectives (Houy *et al.*, 2010), the focus needs to be shifted from process maturity to BPM maturity.

Referring back to their idea that ‘BPR as a BPM support method’, Bucher and Winter (2009) declare that BPM support methods such as BPR and business process modelling are too generic in nature therefore do not address the situational aspects of BPM, for example BPM maturity. Based on their analysis, Bucher and Winter (2009) suggest that an organization’s BPM maturity needs to be gauged by three BPM phases:

1. Process identification, design, and modeling,
2. Process monitoring and, controlling, and
3. Process enhancements.

However, by taking a slightly different direction, based on the Capability Maturity Model (CMM) developed by the Software Engineering Institute at Carnegie Mellon University, Harmon (2004) extends the five levels model to evaluate the BPM maturity status of organizations. Those five levels are (Harmon, 2004, p.2):

- *Level 1: **Initial** - Organizations are immature. Their processes are ad hoc, and undefined, and their projects unpredictable*
- *Level 2: **Repeatable** - Organizations have started to focus on processes and have defined some of their major processes. They can repeat some processes with predictable results, while other processes are not yet well controlled.*
- *Level 3: **Defined** - Organizations have defined all their basic processes and have some degree of control over them. They have begun to emphasize the collection of data and use measures to help manage their processes.*
- *Level 4: **Managed** - Organizations have put a lot of emphasis on the management of processes. They have good process measures and gather data consistently. Their managers rely on measures and data when establishing goals or planning projects. Equally, there is a hierarchical alignment among project managers, so that the achievement of sub-process goals reliably contributes to the achievement of super process goals, and all work to achieve the organization's overall goals.*
- *Level 5: **Optimizing** - Organizations have taught their employees about processes and enlisted them in a continuous effort to refine and improve processes.*

As Harmon (2004) has identified above, an effective BPM maturity is accomplished when an organization reaches and surpasses the fourth level. However, Harmon cautiously admits that only a few organizations have reached this level and have an organization-wide understanding of how processes are related and aligned with corporate strategies and goals.

Reflecting the aforesaid BPM maturity levels and Harmon's (2004) view, Curtis and Alden (2007, p.1) describe BPM maturity models or methods as: *"an evolutionary improvement path that guides organizations as they move from immature, inconsistent business activities to mature, disciplined processes"*.

Agreeing with Harmon (2004) and Curtis and Alden (2007) on BPM maturity models, Rosemann, *et al.*, (2004) confirm that numerous recent BPM maturity models emerged basically with the CMM concept. Following the same direction as Harmon, and Curtis and Alden, Rosemann, *et al.*, (2004) have developed their own CMM-based BPM maturity (BPMM) model. Rosemann, *et al.*, stress that their model does not measure the maturity of business processes but the BPM maturity. Moreover, while adopting the same five level maturity model proposed by Harmon (2004), Rosemann, *et al.* argue that an organisation does not always have to aim for a Level 5 BPM maturity, but rather a level that is most appropriate to and aligned with its goals and objectives.

2.3 Conclusion

The purpose of this literature review is to track the ongoing evolution of the BPM concept, highlight its key definitions and properties, and assess the strengths and weaknesses of the various manifestations of the BPM concept with the focus of satisfying the hypotheses constructs identified in Chapter 1. These manifestations – TQM, WfM, BPR, BPI, BPM lifecycle and BPM maturity – unveil integral processes related to the BPM concept, and demonstrate the evolving ideas within the business science.

BPM is a management approach that is focused on achieving the overall organizational goal using methods, techniques, and software to design, enact, control, and analyze operational processes involving humans, organizations, applications, documents, and other sources of information. Even though the roots of BPM can be traced back to Fredrick Taylor's theories of management science in the 1920's, contemporary BPM has started to evolve in three phases from 1970.

TQM, one of the early manifestations of BPM, promotes quality as the key facilitator of business success, which stresses that companies providing their customers with the best quality service will advance further than competitors. Furthermore, the literature reveals that although BPM and BPR are not the same, due to its focus on procedural rules, WfM is the common underpinning of both BPR and BPM. BPR, the predecessor of BPM, that made headlines in the 1980's and 1990's, was focussed on making radical changes to or *starting over* an organization's business processes to maximize the performance.

Additionally, since BPM is a management discipline of continual process improvement, this chapter also reviewed the process improvement concepts such as the BPI, BPM lifecycle, and BPM maturity. As a result, this comprehensive literature review leads to the next chapter in which the BPM manifestations discussed in the above sections will be concentrated and connected to the constructs of the main research question:

Does the HRIS-enabled HR practices (namely transactional, traditional and transformational) significantly impact the HRM Performance?

In other words, the next chapter of this thesis is poised to review the relationship between HRM (human resources management) – one of the many sub-domains of BPM, and the HRIS (human resources information systems) – a familiar sub-set of BPM systems.

Chapter 3

Business process management (BPM) - A specific review

Contemporary management practices rely heavily on, and are aligned with the provisions of modern information communication technologies (ICT). Therefore, it is widely accepted that business process management (BPM), a contemporary management approach that focuses on managing overall business processes within an organization to accomplish the organizational goal also relies on modern ICT systems. The ICT systems that are aligned with BPM are known as BPM systems (BPMS) (Shaw *et al.*, 2007). The main focus of this chapter is a comprehensive review of this ICT-BPM relationship by reviewing the literature on Human Resource Information System (HRIS) – a form of BPM system and human resources management (HRM) – a support process of BPM. As a continuation from the previous chapter, the first half of this chapter reviews the literature that connects HRM as BPM. The second half of the chapter reviews literature on the relationship between ICT and BPM by focusing on connecting HRIS as the BPM system.

3.1 Human resources management (HRM) as BPM

3.1.1 HRM – a generic review

Human resource management is an organizational function concerning the overall management of people within an organization. The roots of HRM can be traced to the employment practices associated with ‘welfare capitalist employers’ in the United States during the 1930s (Beardwell and Clark, 2007, p.6). Guest (1987) defines HRM as a management strategy that has significant roots in the theories of commitment and motivation and other concepts adopted from the field of organizational behaviour:

“Based on theoretical work in the field of organizational behaviour it is proposed that HRM comprises a set of policies designed to maximize organizational integration, employee commitment, flexibility and quality of work” Guest (1987).

Boxall and Purcell (2000) maintain that HRM is a field that includes anything and everything related to the management of employment relations within an organization. For their part, Jackson and Schuler (1995, p.238) considers HRM as an umbrella term that encompasses three components:

1. *Specific human resource practices such as recruitment, selection, and appraisal;*
2. *Formal human resource policies, which direct and partially constrain the development of specific practices; and*
3. *Overarching human resource philosophies, which specify the values that inform an organization's policies and practices*

Reflecting on the third component above, Storey (1995) considers HRM in an organization as the distinctive employment relations management approach that is aimed at achieving a competitive advantage by strategically deploying a highly talented and motivated workforce. Echoing this sentiment, Boxall and Purcell (2000) emphasize that contemporary HRM should be strategically aligned with the main business goal of an organization. Adding value to this, Lepak *et al.* (2005) claim that HR departments once considered as bureaucratic functions within organizations are now more flexible, creative and strategic in delivering their services. They state (p.140):

“No longer can HR professionals simply focus on monitoring and updating policies and procedures or perform hiring, selecting, training, compensation in isolation. Rather, they are increasingly expected to simultaneously become much more flexible, responsive, efficient, and, ultimately, make a strategic contribution to their company”.

Referring to the work of Guest (1987) and Storey (1992), in their article, Beardwell and Clark (2007, p.5) highlight the two variants of HRM: (1) *Soft HRM - approaches aimed at enhancing the commitment, quality and flexibility of employees, and (2) Hard HRM - emphasis on strategy where human resources are deployed to achieve business goals in the same way as any other resource.* Beardwell and Clark (2007, p.6) further elaborate that “*as the HRM debate has progressed further terms have also been introduced; for example ‘high-commitment management (HCM)’ instead of soft HRM and ‘strategic HRM’ instead of hard HRM*”. The wide range of literature informs that HRM in modern organizations is a combination of ‘soft’ and ‘hard’ HRM. This combination leads to two major HRM models: (1) ‘Matching’ model from Michigan Business School – a model that is closely aligned with ‘hard’ HRM, and (2) ‘The map of HRM territory’ model developed by Beer *et al.* at Harvard University – a model that greatly recognizes the ‘soft’ HRM (Beardwell and Clark, 2007).

Guest (1987) makes set of propositions that combine the ‘soft’ and ‘hard’ aspects of HRM to operate more effective organizations; these propositions are: (1) The goal of integration –

integrating and aligning HRM processes with the strategic goals and plans of an organization for better managerial decision making (2) The goal of employee commitment – to complement the goal of integration, committed employees who are satisfied with their work will be more productive and adaptive, thus contribute better to the success of the organizations, (3) The goal of flexibility/adaptability – flexible organizational structures along with flexible job descriptions and flexible employees respond swiftly and effectively to changes and sustain high utilization of human and other resources, and (4) The goal of Quality – well-defined managerial policies that ensure the recruitment and retention of high quality employees will result in high performance levels.

Even though it is very much perceived that the modern HRM is closely affiliated and associated with the concepts of strategic alignment of an organization, it is very important that one should not simply overlook the natural presence of ‘soft’ HRM within an overall HRM. It is, indeed, the right blend of ‘soft’ HRM and ‘hard’ HRM that leads to an effective HRM. Finding ground to justify modern HRM, Kavanagh *et al.* (2012) maintain that modern ICT play a great role in accommodating the HRM aspects such as ‘best-fit’ and ‘best-practice’ school models (Boxall and Purcell, 2000) and the aforesaid four propositions by Guest (1987).

There are plenty of HRM theories and models that have emerged and are practised within contemporary organizations. However, the focus of this paper is to investigate HRM through the lens of the BPM viewpoint. Therefore, the next section of this chapter discusses the HRM concept from a BPM perspective.

3.1.2 Human resources management (HRM): A BPM perspective

Since HR management is often viewed as a support process within the BPM domain (Sidorova and Isik, 2010), further discussion from this viewpoint is appropriate. Total quality management (TQM), one of the early manifestations of BPM (Lusk *et al.*, 2005), promotes quality as the key facilitator of business success, which stresses that companies providing their customers with the best quality service will advance further than their competitors. TQM as an integrated form of ‘management philosophy’ (Ravichandran and Rai, 2000), coordinates people, business processes and systems of an organization to achieve complete customer satisfaction at every stage, internally and externally (Department of Trade and Industry, 2009). In order to establish the linkage between TQM and HRM, Simmons *et al.* (1995) contend that since the ultimate goal of these two management philosophies are the same and are to be aligned with the overall management strategy, they claim (p.75) “*Both TQM and (S)HRM are underwritten by an*

organization-wide approach". Based on their study, Simmons *et al.* (1995) conclude that since TQM and HRM have many similarities and complementary contributions, they must go hand-in-hand within an organization to place great importance on adopting an organization-wide commitment to improvement. Echoing the same sentiment, McElwee and Warren (2000, p. 433) confirm, "*It is the approach to HRM in the pursuit of quality that is critical to success*". Recognizing that HRM within TQM is an inevitable one, Guest (1992) stresses that committed workforce that create quality can be achieved by training the employees. Proposing that TQM is an organization-wide management approach that is focussed on customer orientation, process orientation and continuous improvement, Hill and Wilkinson, (1995, p.9 &12) also argue that TQM relies heavily on quality HRM.

While many TQM proponents agree that TQM heavily relies on quality HRM, they also admit that there are gaps between these two (Simmons *et al.*, 1995; McElwee and Warren, 2000; Hill and Wilkinson, 1995).

Business process re-engineering (BPR), the next manifestation of modern BPM also has a close linkage to HRM. Unlike TQM, that focuses on overall quality on internal and external processes, BPR, a radical re-design or change of existing business processes (Hammer and Champy, 2001; Hegedus, 2008; Ko, *et al.*, 2009), is aimed at achieving dramatic improvements in critical, contemporary measures of performance, such as cost, quality, service, and speed. As was observed, in the late 1980's and early 1990's, the rapidly changing global economy pressured many organizations to become extensively dynamic and customer-centric, as a result, organizations started to revamp their old management practices by completely reengineering or redesigning their business processes (Misra *et al.*, 2008). However, Willmott (1994) points out that the human factor was largely ignored by the BPR adopters.

Questioning the marginalization of the human aspects within BPR, Willmott (1994, p.41) argues that, "*Making the transition from function-centred to process-oriented organizing practices necessarily depends upon the "human resources" who enact, and are enacted by, BPR*". While agreeing with this argument, Zucchi and Edwards (1999), strongly deny that downsizing – the reduction in employees as a result of radical re-engineering of processes – is the by-product of BPR that caused so many layoffs in the late 1980s and 1990s. They argue that, during the 1990s most of the Western organizations were not implementing BPR but were focussing on downsizing to stay afloat in business; therefore, blaming BPR for downsizing and massive layoffs is irrational. In order to mitigate this perception, the literature does address the human aspects within BPR, in their paper, Zucchi and Edwards (1999) study four HRM related

aspects in association with BPR, namely, (1) organisational structure and culture, (2) the role of managers, (3) team working, and (4) the reward system. Their findings add a positive value to the BPR concept; the results, in fact, show that by maintaining a matrix approach (*i.e.* maintaining a business model that marries functional structure and process-based structure), with little hiccups, BPR does care and support HRM.

While the two major BPM manifestations, namely TQM and BPR are to some extent associated with HRM, the overall concept of HRM is closely linked to the latest version of BPM. This is because, as discussed in detail in the previous chapter, the contemporary BPM as an umbrella of overall business processes and of continual process improvement, the process improvement concepts such as TQM, BPR, BPI and BPM lifecycle are all in certain ways attributed to modern HRM. Adopting a latent semantic analysis (LSA) approach to conduct a comprehensive literature review on business processes, Sidorova and Isik (2010) found that between the period of 1989 and 2009 there were about 75 seminal works that focused on HR in relation to business processes. Their findings conclude that, since HRM involves a variety of activities across functional units, HRM mainly falls under the ‘associated business process’ research category; that means, overall HRM is considered as a support process within BPM domain (Sidorova and Isik, 2010).

In addition to the above argument, by paying close attention to the three BPM interpretations proposed by Doebeli *et al.* (2011), one can see the fit that these interpretations make with the perception of modern HRM. Doebeli *et al.* (2011, p.185) interpret:

1. *BPM as a solution for a business using software systems or technology to automate and manage processes;*
2. *BPM as a broader approach to managing and improving processes that focus on the process lifecycle; and*
3. *BPM as an approach to managing an organisation by taking a process-view.*

The first interpretation acknowledges the adoption of a BPM system (or BPMS) as a solution to automate and manage processes. Going hand in hand with this interpretation, in HRM, a human resources information system (HRIS) is usually adopted to automate and manage the human resource processes. This point will be further discussed later in this chapter.

Within the HRM domain, the second interpretation, BPM as a broader approach that maintains the process lifecycle to manage and improve processes, can be linked to the concepts of HR practices and HRM outcomes. Maintaining the fact that a true process must go through an end-

to-end lifecycle (Betz, 2011), HRM as a (support) process goes through its own lifecycle by implementing the HRM practices, namely transactional, traditional and transformational. These HR practices are considered as ‘processes’ by Sidorova and Isik (2010). For example, a HR practice such as ‘recruit employee’ – a traditional HR practice – starts with preparing a job description and goes on through the steps on publishing the job posting, interviewing the candidates, selecting the candidate, finalizing the job offer, conducting the job orientation, positioning the employee at the job, and then ends with evaluating employee performance in accordance with the HRM outcomes (A further discussion on HR practices and HRM outcomes are conducted in the next two sections).

Finally, the third interpretation, BPM as an approach to managing an organisation by taking a process-view can be connected to ‘HRM is a support process within the BPM domain’, an insight that is maintained by many academics in this area of study (Sidorova and Isik, 2010).

In order to fine tune the concept that HRM is nothing but a BPM concept, a further analysis is required on HRM practices and HRM outcomes.

3.1.3 Human resources (HR) practices

Human resources (HR) practices, also called HR activities are the tasks that are related to the management of human resources, such as routine bookkeeping activities, selection, recruiting, compensation, benefits administration, performance management, training programs, knowledge management, organizational development and so on (Kavanagh, *et al.*, 2012; Wright and Kehoe, 2007; Lepak *et al.*, 2005; Carrig, 1997). Huselid *et al.* (1997) maintain that HR practices influence firm performance. Adding value to this argument, Baruch, Y. (1997, pp.390-391) maintains that “*HRM practices can serve as an indication for the way in which the organization takes care of its people*” and concludes from his empirical study that:

“It appears that the evaluation of the HRM unit using such a process (evaluating HR practices) is better than other options, or at least can provide a feasible, reasonable and comprehensive way of assessing HRM quality. Its advantages are concerned with the achievement of greater accuracy and better reliability and validity”.

Galinec and Vidović (2005), and Sidorova and Isik (2010) contemplate that since HR practices are HR management activities, HR practices can be considered as ‘(business) processes’.

The literature informs a variety of categorization of HR practices. In agreement with this, Lepak *et al.* (2005, pp.141-142) explain that:

“While researchers offer fairly similar delineations of the delivery options available to perform HR practices, there is less agreement regarding the most appropriate aggregation or categorization of HR practices. One of the reasons is the extremely large number of HR practices that firms must consider, each of which is associated with many, albeit subtle, variations. This problem is compounded when we recognize that the same HR practice can be used for vastly different purposes”.

Table 3.1 tabulates some known researchers’ categorization of HR practices:

Table 3.1 - HR Practices

Author(s)	Number of HR practices	Name of the HR practices
Ulrich (1997)	06 (Six)	Staffing, Development, Appraisal, Rewards, Organization Governance and Communication
Paauwe and Richardson (1997)	09 (Nine)	Recruitment/Selection, Human resource planning, Rewards (motivation), Participation (commitment), Internally consistent HR bundles, Decentralization, Training/Employee development, Organizational structures/Internal labour market and Formal procedures
Carrig (1997)	03 (Three)	Transactional, Traditional and Transformational
Lepak and Snell (1998)	04 (Four)	Core, Traditional, Peripheral and Idiosyncratic
Nutley (2000)	07 (Seven)	HR planning, Staffing, Training, Performance appraisals, Employee relations, Compensation and benefits, and HR information systems.
Boselie <i>et al.</i> (2001)	11 (Eleven)	Recruitment and Selection, HR planning, Rewards, Participation (consultation), Internally consistent HR bundles, Decentralization, Training, Opportunities for internal promotion, More Autonomy, Formal Procedures and Coaching
Lepak <i>et al.</i> (2005)	03 (Three)	Transactional, Traditional and Transformational
Tsui (1987)	08 (Eight)	Staffing/Human resource planning, Organization/ Employee development, Compensation/Employee relations, Employee support, Legal compliance, Labor/Union relations, Policy adherence, and Administrative services
Alexopoulos and Monks (2008)	04 (Four)	Selection and Socialisation, Training and Development, Performance appraisal, and Rewards
Kavanagh, <i>et al.</i> (2012)	03 (Three)	Transactional, Traditional and Transformational

As seen in Table 3.1, while others have simply listed the possible HR practices that are connected with their research, Carrig (1997), Lepak *et al.* (2005) and Kavanagh, *et al.* (2012), in consideration of broader acceptance, agree on categorizing the HR practices under three domains, namely, transactional, traditional and transformational. Each of these categories can be further explained as (Kavanagh, *et al.*, 2012):

HR Transactional Practices:

These practices involve the day-to-day transactions that deal mostly with record keeping and bookkeeping – for example, entering payroll information, employee status changes, and the administration of employee benefits.

HR Traditional Practices:

These practices involve HR programs such as planning, recruiting, selection, training, compensation, and performance management.

HR Transformational Practices:

The practices are those actions of an organization that “add value” to the consumption of the firm’s product or service, such as cultural or organizational change, structural realignment, strategic redirection, and increasing innovation. An example of a transformational HR practice would be a training program for retail clerks to improve customer service behavior, which has been identified as a strategic goal for the organization.

Referring back to the works of Galinec and Vidović (2005), and Sidorova and Isik (2010) on identifying HR practices as business processes, for the purpose of this research, activities falling under the transactional, traditional and transformational practices will be considered as business processes related to HR practices.

The impact of measuring HR practices is linked to specific HRM outcomes. Elaborating more on this, Ulrich (1997, p.304) maintains that HR practices directly influence job security, presence of a union, compensation level, culture, and demographics, labor relations (those emphasizing cooperation), quality of work life programs, quality circles, training, extensive recruiting efforts, and incentive compensation systems. Therefore, the next section poised to analyze the prospects of linking HRM outcomes to HRM performance.

3.1.4 HRM performance: measured by HRM outcomes

The literature on HRM and performance suggest that HRM adds value to overall firm performance. That said, there are number of related works and frameworks found in the literature that have been proposed to measure the bond between HRM and firm performance. While the measurement of HR through firm performance is needed, the known HRM academics such as Guest (1987) and Boselie, *et al.* (2005) argue that measuring HRM performance should be done through firm performance and through HRM outcomes. They state that measuring HRM performance through HRM outcomes has been overlooked by many researchers in this field. Guest (1987, p.263) argued that in order to improve the understanding of HRM performance there should be three theories in place: (1) a theory about HRM, (2) a theory about performance, and (3) a theory about how they are linked.

From these two perspectives, the theory and method of approaches measuring HRM performance, there were many studies undertaken on this subject. However, echoing the same sentiment highlighted in 1997 by Paauwe and Richardson, Boselie, *et al.* (2005), also, following an extensive review on the literature conclude that still there was no consistent view on how to measure HRM performance.

Summarizing a list adapted from Dyer and Reeves (1995), Paauwe and Boselie (2005, p.8) highlight three different methods that can be used to measure the HRM performance:

1. *Financial outcomes (e.g., profits; sales; market share; Tobin's q; GRATE)*
2. *Organisational outcomes (e.g., output measures such as productivity; quality; efficiencies)*
3. *HRM-related outcomes (e.g., attitudinal and behavioural impacts among employees, such as satisfaction, commitment, and intention to quit)*

To this end, since this research is focused on developing a conceptual model that measures HRM performance through the HRM outcomes on post-implementation of a human resources information system (HRIS), the third method suggested by Paauwe and Boselie (2005), with HRM-related outcomes, will be adopted for further discussion. In their work, highlighting the previous empirical results, Paauwe and Richardson (1997, p.258) depict the below pattern to explain the firm performance:

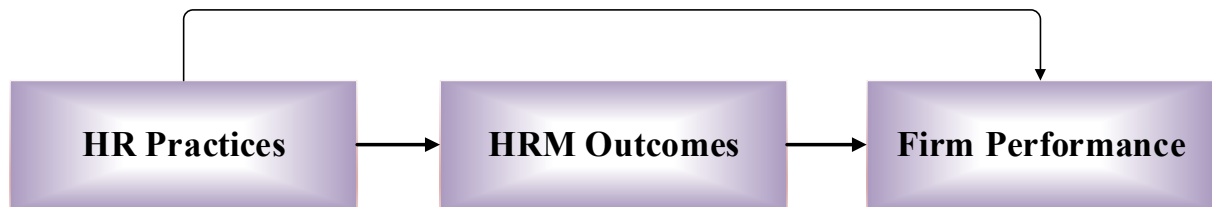


Figure 3.1 - Paauwe and Richardson (1997) Model

The HR practices, as seen above - such as transactional, traditional and transformational practices, influence the HRM outcomes and that in turn influence the firm performance. As this research is in line with the third method suggested by Paauwe and Boselie (2005), the HRM performance will be limited to measuring the HRM outcomes; therefore, the ‘firm performance’ section will not be taken into consideration. That said, at this point, the below diagram illustrates the proposed research constructs (the missing construct in the empty box leading to HR practices connected with dotted arrow will be discussed later in this chapter):

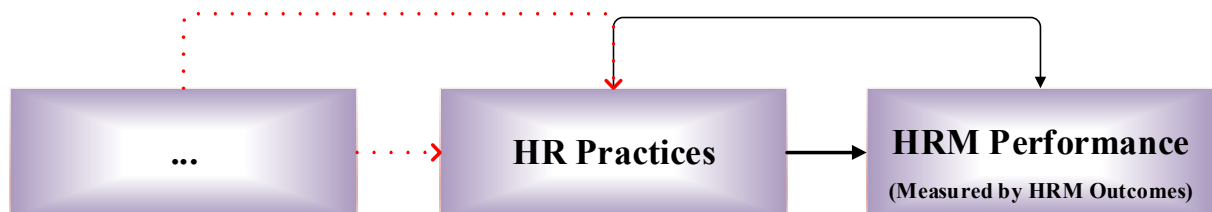


Figure 3.2 - Conceptual model (This research)

Paauwe and Richardson (1997, p.260) divide HRM outcomes into six categories. In their adapted version of Paauwe and Richardson (1997), Boselie *et al.* (2001) propose an enhanced list of HRM outcomes (also) with six variants. Table 3.2 tabulates these two versions of HRM Outcomes:

Table 3.2 - HRM Outcomes

	Paauwe and Richardson (1997)	Boselie <i>et al.</i> (2001)
HRM Outcomes	Turnover	Employee satisfaction
	Dismissal/lay-offs	Employee motivation
	Absenteeism	Employee retention (counterpart of turnover)
	Disciplinary actions and grievances	Employee presence (counterpart of absenteeism)
	Social climate between workers and management	Social Climate between workers and management
	Employee involvement/trust/loyalty	Employee involvement/trust/loyalty/commitment

As seen in Table 3.2, the major differences between the two HRM outcome versions are the addition of employee satisfaction and motivation to the list and omission of disciplinary actions and grievances and dismissal/lay-offs (Boselie *et al.*, 2001). Boselie *et al.* do not give an exact answer for why they have omitted the two HRM outcomes, namely dismissal/lay-offs and disciplinary actions and grievances from the original list of Paauwe and Richardson (1997). The inference here could be that if employees are satisfied and motivated, then there will be fewer complaints and therefore no need for disciplinary actions or dismissals.

Henceforth, the author of this study is convinced that the HRM outcomes list composed by Boselie *et al.* (2001) will serve as a viable tool for analyzing the HRM performance through the HR outcomes. In order to make this HRM outcomes list a compact one, a further categorization is done. While Group 1 includes employee satisfaction, motivation, presence (obverse of absenteeism) and retention (obverse of turnover), Group 2 is composed to include Employee involvement, trust, loyalty, commitment and “social climate” between workers and management.

On the whole, by considering the supporting arguments presented by Sidorova and Isik (2010), Betz (2011), Doebeli *et al.* (2011) and other academics, this author is convinced to proceed with the fact that HRM is a sub-domain of BPM.

3.2 Information communication technology (ICT) and BPM

Since the main focus of this research is to study how ICT processes contribute to a positive and significant BPM performance, referring back to the main research question,

Does the HRIS-enabled HR practices (namely transactional, traditional and transformational) significantly impact the HRM Performance?

this chapter conferred three important aspects towards the core constructs of this research:

1. Why HRM should be considered as a sub-domain of BPM,
2. Why HR practices, such as HR transactional, HR traditional and HR transformational activities are reflected to be the business processes related to HRM, and
3. Why the HRM performance should be measured through HR outcomes.

In line with this discussion, this section now focuses on finding answers to the following questions:

1. Why HRIS should be considered as BPM system?
2. Why an implementation of an HRIS revealed to be the ICT processes?

3.2.1 The BPM-ICT relationship

While BPM has become an important management approach, ICT - the compilation of electronic technologies, and the ICT processes have become the backbone of BPM practices (Koskela and Dave, 2008). To create a sustainable competitive advantage, ICT enhances BPM by dealing with processing, storing, and communicating information within, and across, the functional units of an organization (Chan, 2000). Chan (2000, p.235) endorses this as, “*Today, I(C)T can be an initiator, a facilitator, and an enabler in a business process*”. Taking a step further from this view, Weske *et al.* (2004, p.2) marry the notion of workflow management (WfM) – the automation of business processes – with ICT and define BPM as:

Supporting business processes using methods, techniques, and software to design, enact, control, and analyze operational processes involving humans, organizations, applications, documents and other sources of information.

In other words, the combined application of business processes and ICT constitute an effective BPM within an organization.

For this reason, establishing and then retaining an effective connectivity between the business processes and ICT is considered to be the core to successful BPM. This connectivity between the business processes and ICT not only increases the awareness and understanding of the benefits of BPM, but also reinforces the importance of BPM to the organization (Tallon *et al.* 2000).

Although, the BPM-ICT relationship is discussed in the literature, Giaglis (2001) maintains that, in practice, this relationship needs improvement. Tallon *et al.* (2000) have the same opinion and suggest that since the strategic impacts of ICT have become more important to the success of the business the need for evaluating these impacts also becomes the top priority of researchers. Ravesteyn and Battenberg (2010, p.492), for their part, acknowledge this and add that:

“While business process management (BPM) has achieved a certain standing among both academic and practitioners as a management concept, the

knowledge about IS/I(C)T to support the implementation of BPM is still premature”.

It is assumed that the implementation of BPM that Ravesteyn and Battenberg (2010) mention here is directly connected to the implementation of ICT systems associated with BPM. Thus, the next section of this paper discusses BPM system (BPMS).

3.2.2 Human resources information system (HRIS): a BPM systems (BPMS) perspective

In light of ICT as an enabler of BPM, implementing and practicing BPM are very much driven and supported by ICT systems. The ICT systems that are aligned with BPM are known as BPM systems (BPMS). van der Aalst *et al.* (2003) and Weske (2007) define BPMS as: “*A generic software system that is driven by explicit process designs to enact and manage operational business processes*”. For his part, Reijers (2006, p.390) describes BPMS as a “*piece of generic software that supports activities such as the modelling, analysis and enactment of business processes*”. Shaw *et al.* (2007) consider BPMS as a collection of technologies that allow people to manage the process of changing business processes effectively. In this interest, Melenovsky (2005, p.3) stresses that, the selection of BPMS should be based on, “*how easily business people use the tools to model, analyze, report, simulate and optimize their processes*”.

Despite of the fact that there are number of BPMS available in the market, Ko, *et al.* (2009) and Reijers (2006) contend that, even to date, many BPMS are workflow management (WfM) systems and have not matured to support the diagnosis or evaluation portion of BPM lifecycle. Adding more value to the opinion of Ko, *et al.* (2009) and Reijers (2006), Ravesteyn and Versendaal (2007) observe that most organizations, vendors and resellers of BPMS neglect the ‘specific implementation aspects of BPM’, and as an alternative adopting already existing software development technologies and project management principles.

In accordance with this, the ‘specific implementation aspects of BPM’ Ravesteyn and Versendaal (2007) reference can be connected to the core to this research. In other words, even though the adoption of existing technologies and management principles that are complementary to BPMS and pertinent to a specific area such as HRM, the need for aligning ICT and management principles to the specific purpose of HRM also must be maintained. This being the case, analyzing the purpose of BPMS pertinent to HRM is required. Since a BPMS is supposed to take care of the process-related aspects (van der Aalst, 2013) of a management function and considering the definitions of BPMS by van der Aalst *et al.* (2003), Reijers (2006),

Weske (2007) and Shaw *et al.* (2007), ‘human resources information system’ (hereafter, HRIS) – the ICT system that takes care of HRM – can be considered as a BPMS apposite to HRM.

One of the earlier researchers in this field, DeSanctis (1986, p.15) introduced HRIS as a system designed to support the planning, administration, decision-making, and control activities of HRM. To add further value to this argument, quoting the work of Kavanagh, *et al.* (1990) in their book titled ‘*Human resources information systems*’, Kavanagh, *et al.* (2012, p.17) define an HRIS as a:

“System used to acquire, store, manipulate, retrieve and distribute information regarding an organization’s human resources. An HRIS is not simply computer hardware and associated HR-related software. Although an HRIS includes hardware and software, it also includes people, forms, policies and procedures, and data”.

There are few other definitions of HRIS with slight variations cited in the literature. Since these definitions do not add any new value to the core of the HRIS concept, this study will adhere to the above HRIS definition advocated by Kavanagh, *et al.* (2012).

Even though there are number of commercial interpretations on the types of HRIS that exist, such as commercial off-the-shelf (COTS) HR software applications (Kovach *et al.*, 2002, p.45 and Kavanagh, *et al.*, 2012, p.135), a reliable and pragmatic categorization of four types of HRIS can be adopted from the survey report published by the Chartered Institute of Personnel and Development (CIPD 2004, p.6):

1. *A single HRIS covering several HR functions integrated within itself but not with any other IT system within the wider organisation (**Single HRIS**)*
2. *A single HRIS covering several HR functions integrated within itself and with other IT systems within the wider organisation (**Single Integrated HRIS**)*
3. *A multiple system with two or more stand-alone HRIS covering different HR functions, not integrated with each other or other organisational IT systems (**Multiple HRIS**)*
4. *A multiple system with two or more stand-alone systems covering different HR functions, integrated with other IT systems within the wider organisation (**Multiple Integrated HRIS**)*

The above survey was conducted within the UK business settings and published in 2004. At the time of the survey, the results showed that 59% of the companies use Single HRIS and the integrated HRISs were used by large companies. This HRIS categorization and survey results

will be helpful when it comes to the designing of the survey questionnaire and the data analysis at a later stages of this study.

The advantages of adoption of an HRIS have been discussed by various researchers. While Kovach *et al.*, (2002) acknowledge the administrative and strategic advantages, Beckers and Bsat (2002, p.8) highlight five main advantages of HRIS adoption. They are:

1. An HRIS can significantly improve HR operations, thus competitive advantage,
2. An HRIS can produce number and variety of HR reports,
3. An HRIS can help HRM to shift the focus from transactional to transformational stage,
4. An HRIS can facilitate an employee self-service (ESS) kiosk that in turn would make employee as a partner of overall HRM, and
5. An HRIS with its full capacity can enable a successful HRM re-engineering.

The advantages of adopting an HRIS is widely acknowledged by many academics. Nevertheless, from another point of view, Ngai and Wat (2006) register that while business are usually prepared to accommodate innovative changes that add value to their competitive advantage, many businesses face challenges implementing new technologies, including HRIS, because of a lack of sufficient capital and skills. That said, as it is common with any new adoption of an information systems, HRIS also has its own pitfalls. As Beckers and Bsat (2002) put it, pitfalls of HRIS can be stated as:

1. Costs incurred by HRIS implementation,
2. Management resistance,
3. Employee resistance due to non-user-friendly interfaces,
4. Incompatibility with existing information and management systems, and
5. Inadequate documentation and training on newly adopted HRIS.

Moving forward, the concept of HRIS in this research is studied through the implementation of an HRIS within an organization. An ICT process is all about the interpretation of a business process using the application of information technology, implementation of an HRIS, can therefore be considered as an ICT process. In line with this, the final section of this chapter is poised to discuss how an implementation of an HRIS could be considered as an ICT process.

3.2.3 Implementation of an HRIS: an ICT process

A business process can be defined as a set of activities that are logically structured to perform tasks to achieve a defined business outcome (Davenport and Short, 1990, and Davenport 1994; Zairi, 1997). Similarly, an ICT process is, therefore, fundamentally a business process that deals with any activities that are relevant to the application of an ICT that in turn achieves a defined business outcome (Kalina, 2010). Comparable to this definition, in order to maintain the integrity and validity, Betz (2011) argue that an ICT process also must be in line with BPM standards. Betz adds that since a business improvement hinges on measuring performance (p.6), a process should be measurable with clear initiating and terminating events, elapsed times, and inputs and outputs. Therefore, Betz suggests that an ICT process should be horizontally integrated into end-to-end lifecycle and included with one (crisp and) countable noun and an action verb that generate a strong ‘verb-noun’ naming convention that is recommended by BPM standard; for example, an ICT process should read as, ‘restore service’, ‘complete change’, ‘implement system A’ and so on.

The business process definitions maintained by Davenport and Short (1990), Davenport (1994) and Zairi, (1997) and the ICT process definition derived by Kalina (2010) and Betz (2011) pave a strong foundation to concede that the implementation of an HRIS qualifies as an ICT process.

Furthermore, contemporary ICT management is attributed to major frameworks such as ‘information technology infrastructure library’ (ITIL®), ‘control objectives for information technology’ (COBIT®) and ‘capability maturity model integration’ (CMMI®)¹. ITIL version 3 (or lately ITIL 2011) groups its ICT processes under five publications, namely Service Strategy (SS), Service Design (SD), Service Transition (ST), Service Operations (SO) and Continual Service Improvements (CSI) (Cartlidge *et al.*, 2007 and Glenfis AG, 2013). On the other hand, COBIT 5 lists its ICT processes under five categories – four under ‘Management’ domain, namely APO (Plan), BAI (Build), DSS (Run) and MEA (Monitor) and one under ‘Governance’ domain, namely EDM (Glenfis AG, 2013). CMMI processes are categorized into four processes areas, namely Process Management, Project Management, Engineering, and Support (Siviy *et al.*, 2005).

Even though the processes from these three frameworks are at times called ‘ICT processes’ (or IT processes), Betz, (2011) strongly denies this and declares that none of these frameworks

¹ ITIL® is a registered Trade Mark of the Cabinet Office (UK), COBIT® is a registered trademark of the Information Systems Audit and Control Association and the IT Governance Institute, CMMI®, or Capability Maturity Model-Integrated, is a registered trademark or registered trademark of Carnegie Mellon University in the U.S.

comply with BPM standards, thus cannot be called ‘true’ ICT processes. As an alternative approach, complying with BPM standards, Betz, (2011, p.10) proposes nine ‘true’ ICT processes; they are: Accept Demand, Execute Project, Deliver Release, Complete Change, Fulfill Service Request, Deliver Transactional Service, Restore Service [also known as Resolve Incident], Improve Service and Retire Service.

3.3 Conclusion

The main focus of this chapter was to conduct a comprehensive review of the ICT-BPM relationship by reviewing the literature on HRIS (human resources information system) – a form of BPM system and HRM (human resources management) – a support process of BPM. This chapter started with reviewing human resources management (HRM) basics and definitions. It was learnt that there are two important variants that are fundamental to HRM: (1) Soft HRM - approaches aimed at enhancing the commitment, quality and flexibility of employees, and (2) Hard HRM - emphasis on strategy where human resources are deployed to achieve business goals in the same way as any other resource. The wide range of literature informs that HRM in modern organizations is a combination of ‘soft’ and ‘hard’ HRM. This combination leads to two major HRM models: (1) ‘Matching’ model from Michigan Business School – a model that is closely aligned with ‘hard’ HRM, and (2) ‘The map of HRM territory’ model developed by Beer *et al.* at Harvard University – a model that greatly recognizes the ‘soft’ HRM (Beardwell and Clark, 2007). Even though it is very much perceived that the modern HRM is closely affiliated and associated with the concepts of strategic alignment of an organization, it is very important that one should not simply overlook the natural presence of ‘soft’ HRM within an overall HRM. It is, indeed, the right blend of ‘soft’ HRM and ‘hard’ HRM that leads to an effective HRM.

While the two major BPM manifestations, namely TQM and BPR are to some extent associated with HRM, the overall concept of HRM is closely linked to the latest version of BPM. Since the contemporary BPM is considered as an umbrella of overall business processes and HRM is often viewed as a support process within the BPM domain (Sidorova and Isik, 2010), the BPM concepts such as TQM, BPR, BPI and BPM lifecycle are all in certain ways attributed to modern HRM.

Furthermore, to fine tune the concept that HRM is nothing but a BPM concept, a further analysis was conducted on HRM practices and HRM outcomes. HR practices, also called HR activities are the tasks that are related to the management of human resources and these practices are categorized under three domains, namely, transactional, traditional and transformational.

Galinec and Vidović (2005), and Sidorova and Isik (2010) contemplate that since HR practices are HR management activities, HR practices can be considered as ‘(business) processes’. Since the impact of measuring HR practices is linked to specific HRM outcomes further discussion was conducted on this topic. In this study HR outcomes are categorized into two group, while Group 1 includes employee satisfaction, motivation, presence (obverse of absenteeism) and retention (obverse of turnover), Group 2 is composed to include Employee involvement, trust, loyalty, commitment and “social climate” between workers and management.

This chapter reviewed the literature to prove that human resource information system is a BPM system that is designed to support the planning, administration, decision-making, and control activities of HRM. The ICT process is fundamentally a business process that deals with any activities that are relevant to the application of an ICT that in turn achieves a defined business outcome (Kalina, 2010). Therefore, it is also argued that implementation of an HRIS is nothing but an ICT process. Moving forward, the next chapter will focus on, (a) analyzing two theoretical models found in the literature, and (b) adapting those two models to incorporate a new conceptual model that answers the above research question.

Chapter 4

HRIS-enabled HRM Performance Model: Theoretical Background

This research is poised to find an empirical answer to the following research questions:

Research question 1 (RQ1): Does the HRIS-enabled HR practices (namely transactional, traditional and transformational) significantly impact the HRM Performance?

Research question 2 (RQ2): Does the type of an organization significantly impacts the HRIS-enabled HRM performance model?

Research question 3 (RQ3): Does the size of an organization significantly impacts the HRIS-enabled HRM performance model)?

In order to find answers to the above question, a conceptual model must be developed with strong theoretical background. Therefore, this chapter is focused on, (a) analyzing two theoretical models found in the literature, and (b) adapting those two models to incorporate a new conceptual model that answers the above research question.

Information and communication technologies (ICT) have changed the way businesses perform their management practices. In line with this, contemporary human resources management (HRM) practices also rely heavily on the provision of modern information communication technologies, known as human resource information systems (HRIS). This thesis creates an awareness of the contribution of ICT on business process management (BPM) by analyzing the linkage between impacts of HRIS-enabled HR practices on HRM performance. Therefore, the objective of this research is to (1) examine the impacts of the HRIS-enabled HR practices on HRM performance; and (2) investigate the control variables', such as organization type and organization size, impact on HRIS-enabled HRM performance model. By incorporating the works informed by Lee *et al.* (2012) and Paauwe and Richardson (1997), this thesis develops a conceptual HRIS-enabled HRM performance model that investigates the three main constructs of this research. It has been comprehensively discussed in the previous chapter that HRIS is an ICT system, implementation of HRIS is an ICT-process, HR related business processes are HR

practices and HRM is a sub-domain of BPM. Hereafter, the new conceptual model will be called, ‘HRIS-enabled HRM performance model’.

Although there are plenty of academic discussions available on the BPM-firm performance relationship, the literature does not provide constructive information on how the adoption of ICT impacts the BPM performance (or in other words, in this thesis, HRM performance). As a result, the researcher would like to emphasize here that this thesis is not about the impacts of ‘BPM-firm performance’ relationship, rather it is about the ‘ICT adoption-BPM performance’ or explicitly ‘HRIS adoption-HRM performance’ relationship.

The new conceptual model, HRIS-enabled HRM performance model is a combination of two renowned models informed by Lee *et al.* (2012) and Paauwe and Richardson (1997). This new model will be used to examine the proposition that the HRIS-enabled HR practices significantly impacts HRM performance. That said, the proposed model adopts the work of Lee *et al.* (2012) to investigate the impacts of an implementation of an HRIS on HRM practices. In addition, to explore the impacts of HRIS-enabled HR practices on HRM performance, the new model adopts the HRM evaluation method suggested by Paauwe and Richardson (1997) by concentrating on HRIS-enabled HR practices and HRM performance.

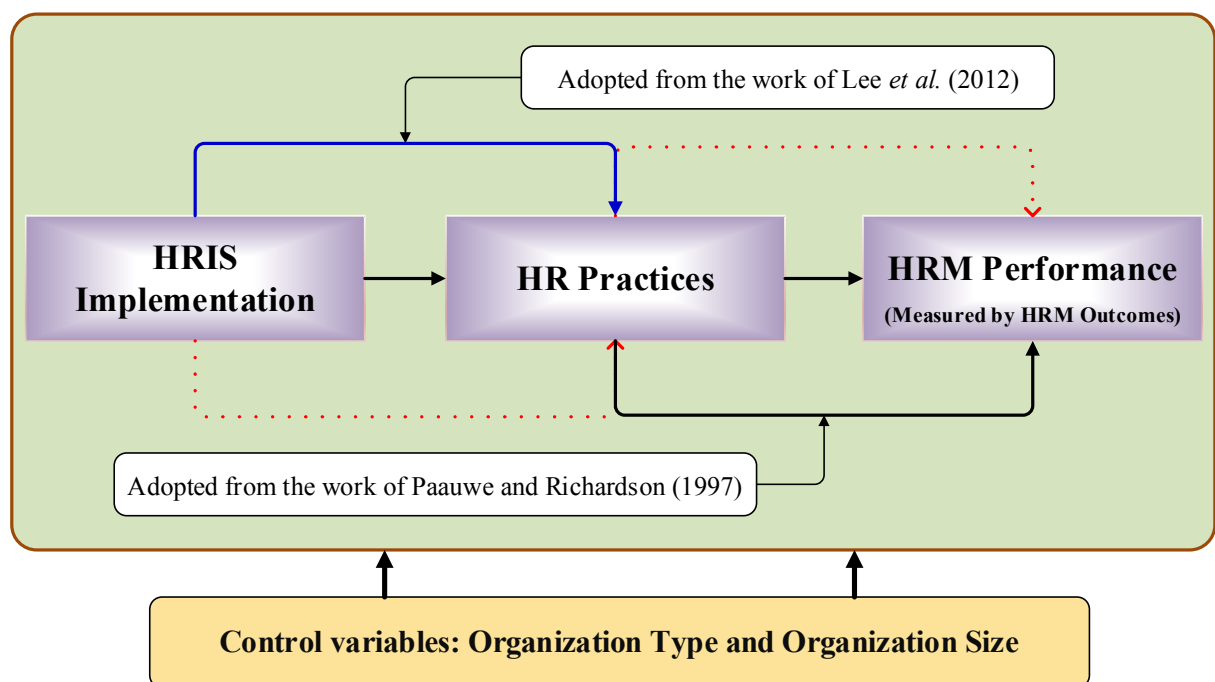


Figure 4.1 - Conceptual HRIS-enabled HRM Performance model

Figure 4.1 depicts the conceptual model (combination of theoretical models informed by Lee *et al.*, 2012 and Paauwe and Richardson, 1997) developed for this thesis. To study the model, survey data from human resources professionals within Canadian settings were collected and analyzed.

The next two sections within this chapter will discuss why these two theoretical models have been adopted and combined to develop a new model that would evaluate the ‘relationship between the HRIS-enabled HR practices and HRM performance. While the next section concentrates on the impacts of an HRIS implementation on the HR practices through the model informed by Lee *et al* (2012), the following section focuses on the impacts of HRIS-enabled HR practices on HRM performance through the HRM model developed by Paauwe and Richardson (1997).

4.1 Impacts of HRIS implementation on HR practices

Note to readers: Since HRIS represents ICT system, HR practices represent business processes and HRM represents BPM in this research, any discussion in this section on ICT, business processes and BPM need be referred back to HRIS, HR practices and HRM respectively.

In the early 90s Davenport and Short (1990) declared that even though the relationship between the business process and ICT is recursive one, *i.e.* ICT supports business processes and in turn business processes support ICT, the actual experience base with ICT-enabled process management was limited. A decade later Giaglis (2001, p.209), for his part, acknowledged the same and noted that, “*Although the benefits of aligning the design of business processes with the design of their corresponding Information Systems should be apparent in theory, such integrated design strategies have rarely been the case in practice*”. That said, in 2012, Lee *et al.* (2012, p.45) echoed the same sentiment and argued that the dilemma remains unchanged and there is very little empirical evidences available to generalize how ICT supports BPM and vice versa, therefore, they had to develop a conceptual model that addresses this issue.

Lee *et al.* (2012) proposed an ICT-BPM-Performance model (Figure 4.2) to investigate the:

- i. impacts of ICTs on BPM,
- ii. effects of BPM on (firm) performance, and
- iii. effects of country differences on such impacts.

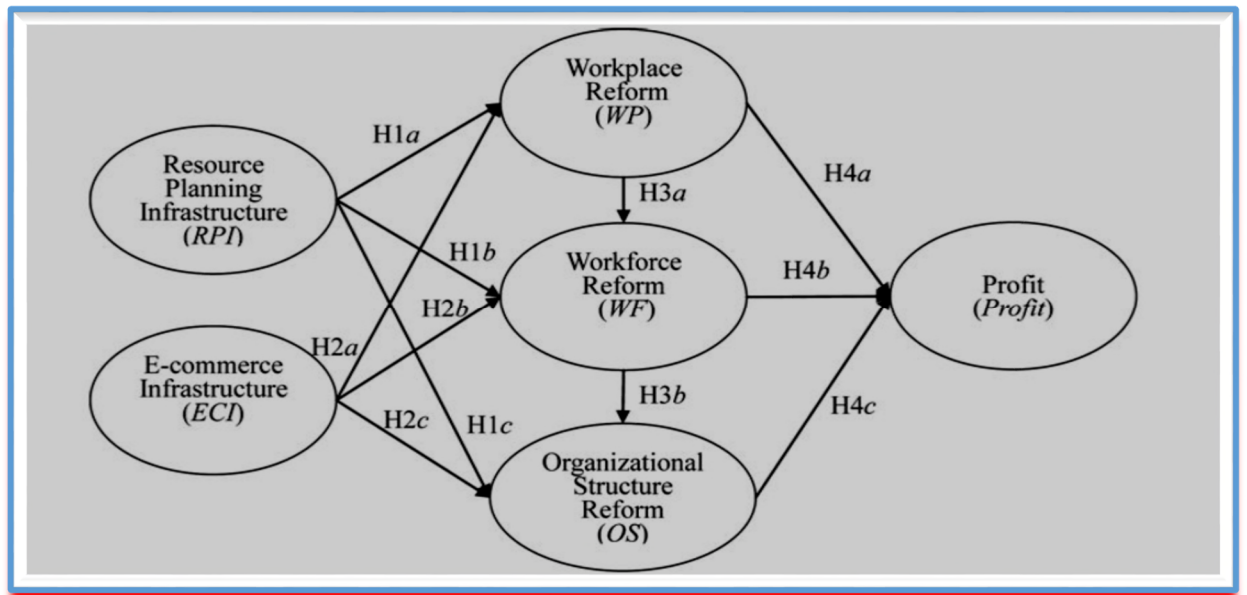


Figure 4.2 - The ICT-enabled BPM model developed by Lee *et al.* (2012)

Instead of adopting any particular BPM software or system as an ICT tool, Lee *et al.* (2012) concentrated on two ICT infrastructures, namely, resource planning infrastructure (RPI) and e-commerce infrastructure (ECI). They do not give any specific reason for why these two ICT infrastructures were chosen. However, since the nature of their study was large, *i.e.* in addition to studying the impacts of ICT on BPM, their research scope also includes the study of industry influences and country differences, it can be wisely assumed that they might have chosen a multi-faceted ICT approach to include RPI and ECI.

Ko, *et al.* (2009) precisely informs that BPM and business process reengineering (BPR) are not the same. However, as can be noticed in their work, Lee *et al.* (2012) use these terms interchangeably. To justify the interchangeable use of BPM and BPR, referring back to the works by Kang, Park, & Yang (2008), Cho and Lee (2011), Huang, Lu and Duan, (2011) and Huang, van der Aalst, Lu and Duan (2011), Lee *et al.* (2012, p.46) argue that,

“Firms sometimes need to change the organizational structure and work flow to align with the adopted ICTs to obtain positive business performance and better operational efficiency. This is why some professionals refer BPR to business process management (BPM) to describe management of improved operational business processes and explore BPM techniques and tools for effective and efficient control flow as well as data-flow”.

As it was extensively discussed in Chapter 2, while BPR is the radical redesign of business processes and ‘starting over’ the key business processes (Hammer and Champy, 2001; Hegedus, 2008), BPM is a process-centric organizational management philosophy (Doebeli *et*

al., 2011) that encompasses overall process management methods, techniques, and software to design, enact, control, and analyze operational processes involving humans, organizations, applications, documents and other sources of information (Weske *et al.*, 2004). Therefore, connecting back to the argument established above by Lee *et al.* (2012), the management of improved operational business processes (*i.e.* BPR) and exploration of BPM techniques and tools for effective and efficient control flow as well as data-flow are central to the BPM concept (as discussed in Chapter 2). This researcher is of the opinion that the three business process dimensions Lee *et al.* (2012) have taken into their overall work, *i.e.* changes in workplace, changes in workforce, and changes in organizational structure, can be considered the characteristics of BPM.

Lee *et al.* (2012) argue that ICT application and its influence on BPM are related to three main dimensions, namely (1) changes in workplace (WP), (2) changes in workforce (WF), and (3) changes in organizational structure (OS). Lee *et al.* maintain that enhanced ICT adoption collapses space and time so that people now work remotely and engage in non-face-to-face coordination activities outside of the office, thus ICT adoption has positive and significant impacts on WP reform. Shedding light on the second dimension, they argue that ICTs activate a growing spread of automation in management practices, such as supply chain management, order management and customer service management that in turn leads to manpower reduction and thus has a positive and significant impact on WF reform. In defence of the third dimension, Lee *et al.* contend that since ICTs are flexible enough to handle changes in the environment and business processes, for example information exchange and sharing through ICTs now enable employees to interact with superiors directly, thus alleviating mediation and increasing cross-unit collaboration, ICT adoption has a positive and significant impact on OS reform. Based on these arguments, Lee *et al.* (2012) developed six hypotheses to be tested in their conceptual model. By looking at the arguments and the hypotheses, one can conclude that the focus of the work of Lee *et al.* (2012) was on the overall ICT infrastructure and firm performance. Therefore, this researcher is of the opinion that the specific ICT systems, such as HRIS, performance management systems (PMS), decision support systems (DDS), management information systems (MIS), *etc.* that can be of help to organizations in managing BPM, have been overlooked.

In a simplistic form, the model suggested by Lee *et al.* (2012) can be drawn as Figure 4.3:



Figure 4.3 - Model by Lee *et al.* (2012) – simple diagram

From another point of view, this researcher is convinced of the fact that the arguments stated by Lee *et al.* (2012) will contribute knowledge to this research. Since the research carried out by this researcher is focused on studying the ICT-BPM performance relationship through HRIS-HRM performance, the BPR-BPM confusion and the country differences that are noticed in the work of Lee *et al.* (2012) are not relevant to this thesis. This thesis is only going to adopt a section of the approach from Lee *et al.* (2012) that includes the two components, explicitly speaking, ICT adoption and the impact of ICT adoption on business processes, therefore leaving out the BPR-BPM mix-up and country difference component of Lee *et al.* work behind.

As justified in Chapter 2, the business process definitions maintained by Davenport and Short (1990), Davenport (1994) and Zairi, (1997) and the ICT process definition derived by Kalina (2010) and Betz (2011) pave a strong foundation to concede that the implementation of an HRIS qualifies as an ICT process. On the same note, Galinec and Vidović (2005), and Sidorova and Isik (2010) contemplate that since HR practices are HR management activities, HR practices can be considered as ‘(business) processes’.

In summary, as part of this research, the following table tabulates the theoretical assumption derived by comparing the work of Lee *et al.* (2012):

Table 4.1 - Lee *et al.* (2012) vs. This Research

Construct		Lee <i>et al.</i> (2012)	This Research
ICT	<i>Focus</i>	ICT Infrastructure	ICT Processes
	<i>Concentration</i>	Resource Planning Infrastructure (RPI) and E-Commerce Infrastructure (ECI).	Implementation of an Human Resources Information System (HRIS)
BPM	<i>Focus</i>	Business process re-engineering (BPR) – characteristics of BPM	Human Resource Management (HRM) – A sub-domain of BPM
	<i>Concentration</i>	Workforce (WF) reform, Workplace (WP) reform and Organizational Structure (OS)	HR transactional practices, HR traditional practices and HR transformational practices
Performance	<i>Focus</i>	Firm performance	HRM performance
	<i>Concentration</i>	Profit	HRM outcomes

By adapting the concept of the above model by Lee *et al.* (2012), this research will focussed on the following adapted diagram (Figure 4.4):



Figure 4.4 - Adapted model from Lee *et al.* (2012) – simple diagram

The model suggested by Lee *et al.* provided a strong theoretical background to connect the first two boxes of the above diagram; *i.e.* the linkage between HRIS implementation (ICT process) and HR practices, in other words HRIS-enabled HR practices, has been justified by the literature and the Lee *et al.* model.

To closely examine the second linkage between HRIS-enabled HR practices and HRM performance of this conceptual model, a further theoretical analysis is required. With this in mind, the next section is set to analyze the HR practices-HRM performance through the HRM framework composed by Paauwe, J. and Richardson, R. (1997).

4.2 Impacts of the HRIS-enabled HR practices on HPM performance

The main aim of this research is to test the impacts of the HRIS-enabled HR practices on the HRM performance (in this case measured by HRM outcomes).

A number of literature on HRM and performance suggest that HRM adds value to overall firm performance. However, the measurement of HRM through HRM performance is also needed to justify the existence of effective HRM within an organization. The known HRM academics such as Guest (1987) and Boselie, *et al.* (2005) argue that not only measuring HRM performance through firm performance is important but also measuring HRM performance through HRM outcomes is critical. This being the case, based on previous works done in this field, a well-known framework composed by Paauwe, J. and Richardson, R. (1997) has its own weight to justify how HR practices can influence HR outcomes.

Adapted from a list of methods that can be used to measure HRM performance suggested by Dyer and Reeves (1995), Paauwe and Boselie (2005, p.8) propose three different methods that can be used to measure the HRM performance:

1. *Financial outcomes (e.g., profits; sales; market share; Tobin's q; GRATE)*
2. *Organisational outcomes (e.g., output measures such as productivity; quality; efficiencies)*
3. *HRM-related outcomes (e.g., attitudinal and behavioural impacts among employees, such as satisfaction, commitment, and intention to quit)*

Since this research is focused on developing a conceptual model that measures the HRM performance through the HRM outcomes on post-implementation of a human resource information system, the third method suggested by Paauwe and Boselie (2005), *i.e.* HRM-related outcomes, will be adopted for further discussion.

There are plenty of studies aimed at measuring HRM-firm performance through financial outcomes (for example: Huselid, *et al.* (1997) – *profit, sales, GRATE (gross rate of return on assets), Tobins q*) and organizational outcomes (for example: Soltani *et al.* (2004) – *TQM (total quality management)*), however, few studies have been conducted through HRM-related outcomes (Wright *et al.*, 2003). Therefore, this thesis will focus on HRM outcomes as a benchmark to measure the HRM performance.

In their paper, highlighting the previous empirical results, Paauwe and Richardson (1997, p.258 & 260) depict the pattern below to explain firm performance:

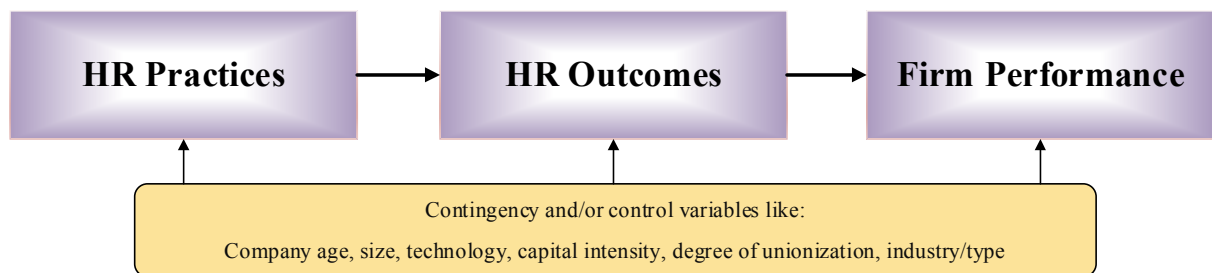


Figure 4.5 - Model by Paauwe and Richardson (1997) – simple diagram

HR practices influence the HRM outcomes and that in turn influences firm performance. Since this research targets the third method suggested by Paauwe and Boselie (2005) and partially adopts the HRM model suggested by Paauwe and Richardson (1997), HRM performance will be limited to measuring the HRM outcomes; therefore, the ‘firm performance’ section will not be taken into consideration. Therefore, the adopted model for this thesis from Paauwe and Richardson (1997) can be illustrated as given below:

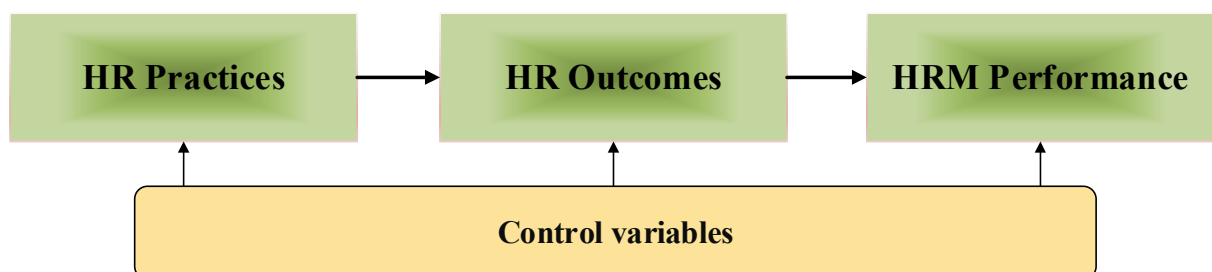


Figure 4.6 - Adopted model from Paauwe and Richardson (1997) – simple diagram

Moreover, Paauwe and Richardson (1997) list six items as HRM outcomes, namely turnover, dismissal/lay-offs, absenteeism, disciplinary actions and grievances, social climate between

workers and management, and employee involvement/trust/loyalty. However, the researcher of this thesis is convinced that the HRM outcomes listed by Boselie *et al.* (2001) – as seen in the previous chapter – will serve as a viable tool for analyzing the HRM performance through the HR outcomes, thus decided to make this list as the benchmark for this thesis. In order to make the HRM outcomes listed by Boselie *et al.* compact and mitigate the confusion on survey questionnaire, a further categorization was required. Therefore, while ‘Group 1’ is set to include HRM outcomes as employee satisfaction, motivation, presence (obverse of absenteeism) and retention (obverse of turnover) under this group, ‘Group 2’ is composed to include employee involvement, trust, loyalty, commitment and “social climate” between workers and management.

In summary, as part of this research, the following table tabulates the theoretical assumption derived by comparing the model suggested by Paauwe and Richardson (1997):

Table 4.2 - Paauwe and Richardson (1997) Vs. This Research

Construct		Paauwe and Richardson (1997)	This Research
HR Practices	<i>Focus</i>	HR practices	HR practices
	<i>Concentration</i>	Recruitment/selection, Human resource planning, Rewards (motivation), Participation (commitment), Internally consistent HR bundles, Decentralization, Training/employee development, Organizational structures/internal labour market, and, Formal procedures	HR Transactional practices HR Traditional practices HR Transformational practices
HRM Outcomes	<i>Focus</i>	HR Outcomes	HR Outcomes
	<i>Concentration</i>	Turnover, Dismissal/lay-offs, Absenteeism, Disciplinary actions and grievances, Social climate between workers and management, and Employee involvement/trust/loyalty	HRM Outcome 1: Employee satisfaction, motivation, presence (obverse of absenteeism) and retention (obverse of turnover). HRM Outcome 2: Employee involvement, trust, loyalty, commitment and “social climate” between workers and management
Performance	<i>Focus</i>	Firm performance	HRM performance
	<i>Concentration</i>	Profit, Market value of the Company, Productivity, Market share, Product/service quality, Customer satisfaction and Development of products/services.	HRM outcomes

Subsequently, by combining the models of Lee *et al.* (2012) and Paauwe and Richardson (1997), a new conceptual model for this thesis can be illustrated as given below:

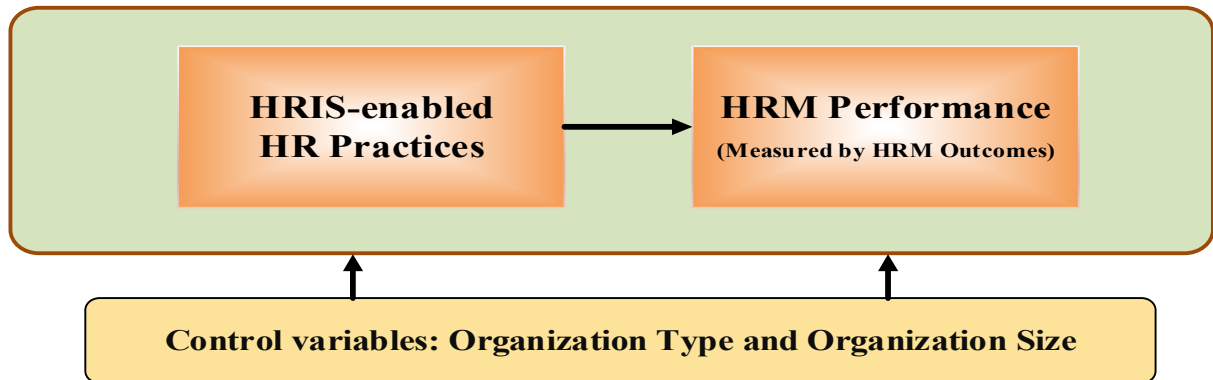


Figure 4.7 - Adapted model from Lee et al. (2012) and Paauwe and Richardson (1997)

Therefore, to establish a link between HRIS-enabled HR practices and HRM performance, the following hypotheses have been formulated:

Hypothesis 1 (H1): HRIS-enabled HR transactional practices significantly impact the HRM Performance.

Hypothesis 2 (H2): HRIS-enabled HR traditional practices significantly impact the HRM Performance.

Hypothesis 3 (H3): HRIS-enabled HR transformational practices significantly impact the HRM Performance.

Meanwhile, by means of examining the model by Paauwe and Richardson (1997), close attention must be given to the contingency and control variables stated in the lower box of the Figure 4.6. Paauwe and Richardson (1997) maintain organization age, size, type, technology, capital intensity, degree of unionization and industry as the contingency and control variables that may affect the HRM performance. Since this thesis is partially adopting the above model, a survey questionnaire is designed to collect data on organization type and size. Then this data will be tested for the impacts on the conceptual model.

Therefore, the following hypotheses have been formulated to test the impact of the organization type and size (the control variables) on the new HRIS-enabled HRM performance model:

Hypothesis 4 (H4): Organization type significantly impacts the HRIS-enabled HRM performance model.

Hypothesis 5 (H5): Organization size significantly impacts the HRIS-enabled HRM performance model.

The above five hypotheses are illustrated in the following figure:

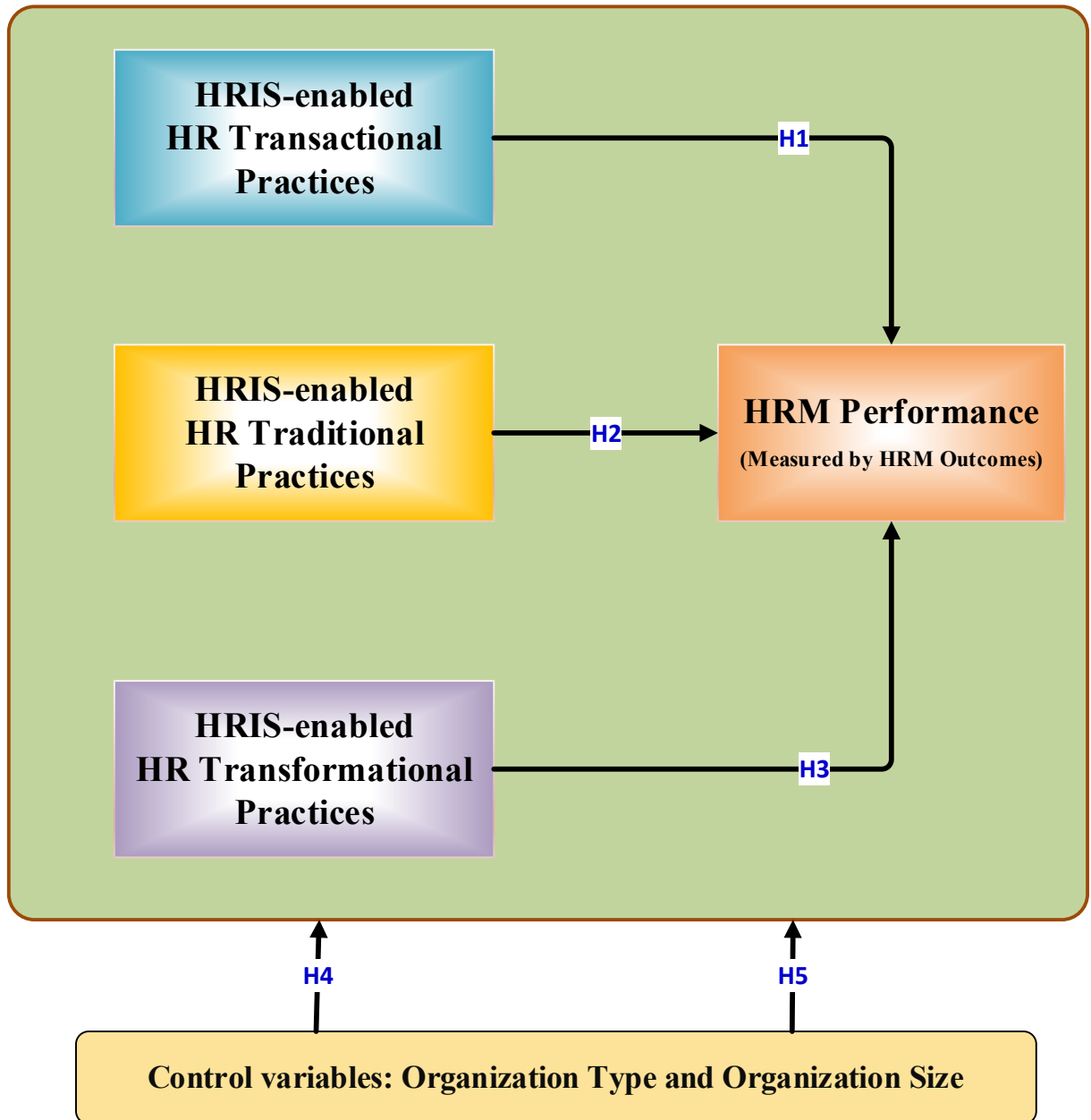


Figure 4.8 - Descriptive conceptual model for this thesis

4.3 Conclusion

In order to develop a HRIS-enabled HRM performance model, this chapter started with the analysis of an ICT-enabled BPM model developed by Lee *et al.* (2012). Disregarding the BPR-BPM confusion found in this work and the country differences included in the model, the author of this thesis was convinced to adopt part of this model in the development of a conceptual model. This is because, the ICT-BPR relationship that are found in the work of Lee *et al.*, are very much in line with the purpose this thesis. That said, the first two constructs, *i.e.* the HRIS

implementation and the HR practices, of the conceptual model of this thesis is attributed to the model developed by Lee *et al.* (2012).

In the second half, the HRM model suggested by Paauwe and Richardson (1997) was analysed to study how HRM performance can be measured through HRIS-enabled HR practices and HRM outcomes. This analysis fulfilled the remaining part of the conceptual model of this thesis. That said, while adopting the notion of HRM outcomes as a HRM performance from Paauwe and Richardson (1997), the actual list of HRM outcomes was actually derived from Boselie *et al.* (2001). This list, in fact, is the modified version of Paauwe and Richardson (1997) and was further categorized into two groups to mitigate the confusion on the survey questionnaire. Research methodology will be discussed in Chapter 5.

Chapter 5

Research Methodology

This epistemological relativist research contributes to the field of business process management (BPM) by developing a conceptual ‘HRIS-enabled HRM performance model’ and integrating human resource information system (HRIS), human resources (HR) practices and human resources management (HRM) performance perspectives. The key criteria for business and management research rest on the fundamental concepts of reliability, replication, and validity (Bryman, and Bell, 2007).

In line with the epistemological position, a deductive theoretical approach is adopted to (a) study two known theories, (b) develop hypotheses, (c) design the conceptual model, (d) collect data from a survey, (e) analyze the findings, and (f) test the conceptual model (Bryman and Bell, 2007). Sections (a), (b) and (c) have been discussed in the previous chapters, therefore, this chapter is poised to discuss section (d), ‘collect data from a survey’, which is in fact the discussion of research methodology and research methods. Because the research methodology and research methods have plenty of information for discussion, the researcher has decided to split these sections into multiple chapters. While this chapter, Chapter 5, discusses the research methodology, Chapter 6, Chapter 7 and Chapter 8 will be discussing research methods in three sub-sections pertinent to research methods, namely, Subjects, Measures and Procedures respectively.

This chapter on research methodology discusses the research design process, then the deductive theory approach in detail and the two data analysis approaches used in this research, namely, ordinal logistic regression (OLR) and Kendall’s tau-b correlation.

5.1 The research design

Easterby-Smith, *et al.* (2008) argue that the notion of research design, *i.e.* deciding the data-theory relationship in management research, is central to one of the crucial issues faced by researchers. Easterby-Smith, *et al.* maintain there are three reasons why an understanding of underlying research philosophies is very useful (p.56):

1. *It can help to clarify research design.*
2. *Knowledge of philosophy can help the researcher to recognize which designs will work and which will not work.*

3. *It can help the researcher identify, and even create, designs that may be outside his or her past experience.*

Taking the lead from the above suggestions, this researcher did a comprehensive study on research philosophies.

This study began by clarifying the main research terminologies. Table 4.1 below lists and defines the four main research terminologies composed by Easterby-Smith, *et al.* (2008, p.60):

Table 5.1 - Research Terminology

1	Ontology	Philosophical assumptions about the nature of reality (<i>i.e.</i> theory of existence).
2	Epistemology	General set of assumptions about the best ways of inquiring into the nature of the world (<i>i.e.</i> theory of knowledge).
3	Methodology	Combination of techniques used to enquire into a specific situation (<i>i.e.</i> theory of methods).
4	Methods	Individual techniques and tools for data collection, analysis, <i>etc.</i>

Ontology, that reality is external and objective (*i.e.* theory of existence), and the epistemology, that knowledge is only of significance if it is based on observations of this external reality (*i.e.* theory of knowledge), are central to deciding the research methodology. Even though ontology and epistemology philosophical were born from within the natural sciences, these considerations have now expanded into the territory of social sciences, confirmed by both Easterby-Smith, *et al.*, (2008) and Bryman and Bell (2007). While ontological positions are referred to representationalism, relativism and nominalism, epistemological positions are referred to positivism, relativism and social constructionism (Easterby-Smith, *et al.*, 2008, p.62). Although, relativism is a common position that falls into both ontology and epistemology categories, comparing and linking other extreme positions within ontology and epistemology will be useful to the researcher to decide the research methodology. The following table by Easterby-Smith, *et al.*, (2008, p.62) summarizes the links between ontological positions and epistemological positions:

Table 5.2 - Ontology and epistemology in social science

Ontology of social science	Representationalism	Relativism	Nominalism
Truth	Requires verification of predictions.	Is determined through consensus between different viewpoints.	Depends on who establishes it.
Facts	Are concrete, but cannot accessed directly.	Depend on viewpoint of observer.	Are all human creations.
Epistemology of social science	Positivism	Relativism	Social constructionism

This study focuses on assessing the association between five concepts. The concepts are the building blocks of a theory and represent the points around which this research is conducted must be measured, as informed by Bryman and Bell (2007). Therefore, in this study, while observing the control variables such as organization type and size, the researcher is trying to test the association between the HRIS enabled by HR practices and HRM performance. The concepts in this study are the organization type, organization size, HRIS, HR practices and HRM performance.

The main aims of this study were: to identify if organization type and organization size impact the HRIS-enabled HR practices; and to establish which HRIS-enabled HR practices were linked to HRM performance. The empirical data was collected by conducting a survey among HR professionals within organizations in Canada. As can be seen, most of the features of this study can be categorized as relativist position illustrated in Table 4.2. It starts with the ontological assumption that HRIS-enabled HR practices exist within organizations. The researcher was able recognize and categorize these HRIS-enabled HR practices within a Canadian context to test the following hypotheses:

Hypothesis 1 (H1): HRIS-enabled HR transactional practices significantly impact the HRM Performance.

Hypothesis 2 (H2): HRIS-enabled HR traditional practices significantly impact the HRM Performance.

Hypothesis 3 (H3): HRIS-enabled HR transformational practices significantly impact the HRM Performance.

Hypothesis 4 (H4): Organization type significantly impacts the HRIS-enabled HR practices (namely transactional, traditional and transformational) and HRM performance.

Hypothesis 5 (H5): Organization size significantly impacts the HRIS-enabled HR practices (namely transactional, traditional and transformational) and HRM performance.

In other words, after confirming the external reality (ontological relativist position), the study moved to the epistemological relativist position, that knowledge is only significant if it is based on observations of this external reality, to test the hypotheses. This is a common pattern in social science research, inform Easterby-Smith, *et al.*, (2008).

The study then continued with relativist epistemological assumptions to the philosophy of methodology, the combination of techniques used to enquire into a specific situation (*i.e.* theory of methods). “*The acceptance of a particular epistemology usually leads the researcher to adopt methods that are characteristic of that position*”, suggest Easterby-Smith, *et al.*, (2008, p.62). The following table depicted by Easterby-Smith, *et al.*, (2008, p.63) helped this researcher to decide on the right epistemology method:

Table 5.3 - Methodological implications of different epistemologies within social science

Social science epistemologies <i>Elements of methodologies</i>	Positivism	Relativism	Social constructionism
Aims	Discovery	Exposure	Invention
Starting points	Hypotheses	Propositions	Meanings
Designs	Experiment	Triangulations	Reflexivity
Techniques	Measurement	Survey	Conversation
Analysis/interpretations	Verification/falsification	Probability	Sense-making
outcomes	Causality	Correlation	Understanding

Since this research is in agreement with the relativist epistemological assumptions, that knowledge is only of significance if it is based on observations of the external reality, further discussion in this direction is required.

Relativist epistemology assumes that there are regular patterns in human organizational behaviour, but these patterns are difficult to detect and extremely difficult to explain due to the number of factors and variables (Easterby-Smith, *et al.*, 2008, p.90). As a result, Easterby-Smith, *et al.* consider cross-sectional analysis as the preferred method in relativist research designs. Cross-sectional analysis enables multiple factors to be measured at one specific point in time, possibly within a large population or a representative sub-group of the target group. Bryman and Bell (2007, p.55) position cross-sectional analysis as that which:

“... entails the collection of data on more than one case (usually quite a lot more than one) and at a single point in time in order to collect a body of quantitative or quantifiable data in connection with two or more variables (usually many more than two), which are then examined to detect patterns of association”.

Furthermore, a quality research design should address the ‘research strategy’ at its early stages (Bryman and Bell, 2007). According to Bryman and Bell (2007), a research strategy is a general orientation to the conduct of business research that includes the research type as quantitative or qualitative (in some cases it could be a mixed type). While quantitative research can be interpreted as a research strategy that emphasizes quantification in the collection and analysis of data, a qualitative research can be interpreted as a research strategy that usually emphasizes words rather than quantification in the collection analysis of data (Bryman and Bell, 2007, p.28). Table 5.4 below suggested by Bryman and Bell (2007, p.28) tabulates the fundamental differences between quantitative and qualitative research strategies:

Table 5.4 - Fundamental differences between quantitative and qualitative research strategies

	Quantitative	Qualitative
Principle orientation to the role of theory in relation to research	Deductive; testing of theory	Inductive; generation of theory
Epistemological orientation	Natural science model, in particular positivism	Interpretivism
Ontological orientation	Objectivism	Constructionism

As it is seen above in the discussion and in Table 5.4, it can be concluded that, relativist epistemological assumption comes under the quantitative research strategy. In particular, deductive theory approach, that leads to the testing of a theory (or theories) is considered to be a quantitative research strategy, has been adopted as the research methodology of this study.

5.2 Deductive theory approach

As noted above in Table 5.1, research methodology, a combination of techniques used to enquire into a specific research area (*i.e.* theory of methods), is another important aspect that constitutes a quality research design. Consequently, this study adopts the deductive theory as the “*commonest view of the nature of the relationship between theory and research*” (Bryman and Bell, 2007, p.11). In deductive theory approach, Bryman and Bell (2007, p.11) maintain, “*the researcher on the basis of what is known about a particular domain and of the theoretical considerations in relation to that domain, deduces a hypothesis (or hypotheses) that must then be subjected to empirical scrutiny*”. To describe the sequence of the six steps of the deductive theory approach, Bryman and Bell (2007, p.11) depict the following diagram (Figure 5.1):

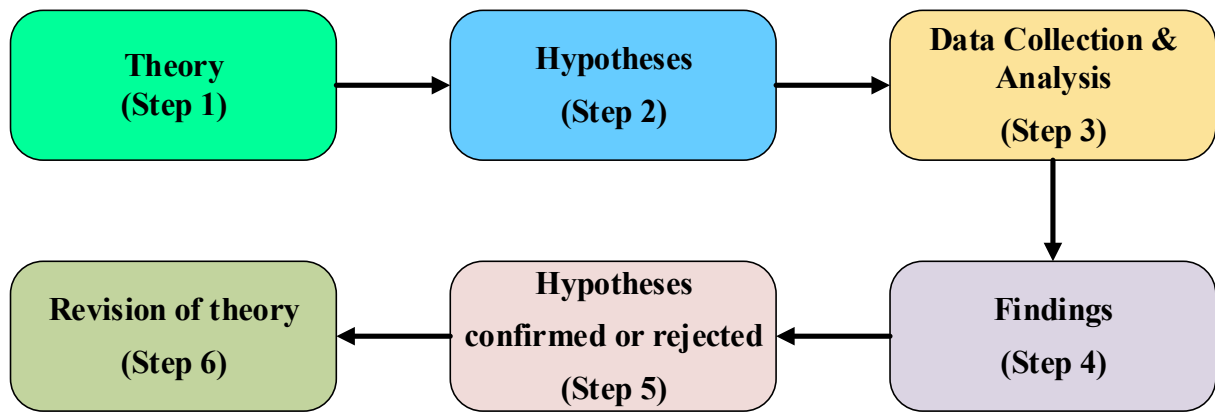


Figure 5.1 - The deductive theory sequence

In this research, two theories informed by Lee *et al.* (2012) and Paauwe and Richardson (1997) were taken into consideration. From these two theories, three hypotheses were formulated. Then, by incorporating the works of Lee *et al.* (2012) and Paauwe and Richardson (1997), based on the structural equation modeling, this study developed a conceptual ‘HRIS-enabled HRM performance model’ that is used to investigate the main constructs of this research.

Even though deductive theory approach seems very linear, Bryman and Bell (2007) are cautious that this may not always be the case. They argue that there are several reasons why the researcher’s view of the theory may change because of the outcomes of the analysis of the collected data. They list three reasons that could change the researcher’s initial view of the theory (p.13):

1. *New theoretical ideas or findings may be published by others before the researcher has generated his or her findings;*
2. *The relevance of set of data for a theory may become apparent only after the data have been collected;*
3. *The data may not fit with the original hypotheses.*

That said, the first two steps of the deductive theory approach informed by Bryman and Bell (2007), namely theory and hypotheses steps were discussed in detail in the previous chapters. Research methods, the third step in the deductive theory sequence illustrated in Figure 1, have plenty of information for discussion, thus, the researcher has decided to split research methods into three chapters. Chapter 6, Chapter 7 and Chapter 7 will be discussing research methods in three sub-sections, namely, Subjects, Measures and Procedures respectively. Chapters 9 and 10 will be discussing the outcome of the study by analysing the data, *i.e.* the ‘Findings’ and ‘Hypotheses conformed or rejected’ steps (*i.e.* Steps 4 & 5) in the deductive theory approach.

Data analysis of this research is based on two known approaches, namely, Kendall's tau-b correlation and OLR. While the later chapters discuss the findings of the study descriptively, the following sections of this chapter identifies the data analysis approaches and their importance in this study.

5.3 Kendall's tau-b correlation

Kendall's tau correlation coefficient analyses measure the strength of the relationship between two variables. Correlation coefficient values are determined between minus one and plus one; while the positive correlation suggests that the variables are perfectly linear by an increasing relationship and on the other hand, the negative correlation suggests that as the variables are perfectly linear by an decreasing relationship (Morgan *et al.*, 2013 and Bolboaca, S. D. and Jäntschi, 2006).

In this study Kendall tau-b correlation is used to measure the strength of relationship between HRIS-enabled HR practices and the HRM performance.

Bolboaca, S. D. and Jäntschi (2006, p.192) inform that:

“Kendall tau is a non-parametric correlation coefficient that can be used to assess and test correlations between non-interval scaled ordinal variables. Frequently the Greek letter τ (tau), is use to abbreviate the Kendall tau correlation coefficient. The Kendall tau correlation coefficient is considered to be equivalent to the Spearman rank correlation coefficient. While Spearman rank correlation coefficient is like the Pearson correlation coefficient but computed from ranks, the Kendall tau correlation rather represents a probability”.

Romdhani, *et al.* (2014, p.210) echo the same sentiment and maintain that *“Kendall's tau is a measure of association defined as the probability of concordance minus the probability of discordance”*. While accepting that correlations such as Pearson's correlation, Spearman's correlation, Gamma correlation and Kendall's tau are intended to measure the strength of relationship, Noether (1981, p.41) argues that *“different correlation coefficients measure strength of relationship in different ways”*, therefore, the researcher should adopt a correlation that has an intuitively simple interpretation by employing an algebraic structure in his or her study. Since Kendall's tau, unlike other correlation, has an intuitively simple interpretation that employs an algebraic structure, Noether suggests that Kendall's tau is one of the best approaches to measure the strength of the relationship.

There are three types of Kendall's tau correlation available, namely, Kendall's tau-a, Kendall's tau-b and Kendall's tau-c.

Ensuring that both variables are ordinal, Kendall's tau-a statistic tests the strength of association of the cross tabulations. However, this test does not make any adjustments for ties. On the other hand, the Kendall's tau-b statistic, unlike Kendall's tau-a, makes adjustments for ties.

“Kendall's tau-b is a measure of association often used with but not limited to 2-by-2 tables. It is computed as the excess of concordant over discordant pairs ($C - D$), divided by a term representing the geometric mean between the number of pairs not tied on X (X_0) and the number not tied on Y (Y_0)”

informs the Unesco.org (n.d.) website on 'Non-parametric Measures of Bivariate Relationships'. Unesco.org (n.d.) further adds that, “Kendall's tau-b requires binary or ordinal data. It reaches 1.0 (or -1.0 for negative relationships) only for square tables when all entries are on one diagonal. Kendall's tau-b equals 0 under statistical independence for both square and non-square tables.

While Kendall's tau-b is used for square tables, Kendall's tau-c is used for non-square tables, i.e. Kendall's tau-c is more suitable for rectangular tables (Bolboaca, S. D. and Jäntschi, 2006). *Kendall's Tau-c, also called 'Kendall-Stuart tau-c', is a variant of Kendall's tau-b for larger tables. It equals the excess of concordant over discordant pairs, multiplied by a term representing an adjustment for the size of the table”* confirms Unesco.org (n.d.).

Furthermore, Terziovski and Guerrero (2014) advise the use of Kendall's tau-b as a more robust correlation coefficient under a wide variety of data distribution. Since this study has a wide range of data distribution that tries to measure the strength of relationship between a HRIS-enabled HR practices and the HRM performance, this researcher has decided to adopt Kendall's tau-b correlation. The correlation results from Kendall's tau-b will be discussed in Chapter 9.

5.4 Ordinal logistic regression (OLR)

Ordinal dependent variables that have natural ordering between their levels, such as Likert scale levels, can be predicted by one or more independent variables using OLR (Kleinbaum and Klein, 2002). For example, in this study ordinal logistic regression is used to predict the belief that the organization type and organization size impact the HRIS enabled HR practices, namely, transactional, traditional and transformational practices, and the HRM performance. The independent variables in the analyses are organization type and organization size.

In this study, the independent variable ‘organization type’ has four categories, namely ‘Private’, ‘Government’, ‘Semi-government’ and ‘Non-government’. And the independent variable ‘organization size’ has three categories, namely, ‘Less than 500’, ‘Between 500 and 5000’ and ‘More than 5000’. The following table shows how these independent variables are coded in the IBM SPSS system:

Table 5.5 - Independent variables coding in IBM SPSS

Organization Type		Organization Size	
Category	Code	Category	Code
Private	1	Less than 500	1
Government	2	Between 500 and 5000	2
Semi-Government	3	More than 5000	3
Non-Government	4		

The dependent variables were measured on a 6-point Likert item from "Strongly Disagree" to "Strongly Agree" (however, eventually reduced to 5-point Likert scale as explained in Chapter 7), based on two independent variables: organization type and organization size. The ordinal logistic regression model that was used in this study is called the proportional odds or cumulative logit model. Kleinbaum and Klein (2002, p.305) explain proportional odds ordinal logistic regression model as:

“To illustrate the proportional odds model, assume we have an outcome variable with five categories and consider the four possible ways to divide the five categories into two collapsed categories preserving the natural order.

Eboli and Mazzulla (2009, p.45) echo the same and maintain, *“The basic idea underlying the POM model is re-expressing the categorical variable in terms of a number of binary variables according to the adopted ordinal scale”*.

The assumption of proportional odds means (*i.e.* cumulative odds ordinal regression with proportional odds) that each independent variable has an identical effect at each cumulative split of the ordinal dependent variable thus the dependent variable will be measured on a dichotomous scale (Laerd Statistics, 2015). As stated above, the dependent variables were measured on a 5-point Likert item from "Strongly Disagree" to "Strongly Agree". To measure whether each independent variable has an identical effect, there were four categories created.

For example, in category 1 (or **Cat1**) any answer that is ‘Strongly Disagree’ will be grouped as one cumulative split and coded as ‘1’ and any other answer (*i.e.* ‘Disagree’, ‘Neutral’, ‘Agree’ and ‘Strongly Agree’) will be grouped as the 2nd cumulative split and coded as ‘0’ (that is, dichotomous variables either ‘1’ or ‘0’). In other words, probability of receiving the answer ‘Strongly Disagree’ is coded as ‘1’ and probability of receiving the answer ‘Disagree’, ‘Neutral’, ‘Agree’ and ‘Strongly Agree’ will be coded as ‘0’. Likewise, in category 2 (or **Cat2**) any answer that is ‘Strongly Disagree’ OR ‘Disagree’ will be grouped as one cumulative split and coded as ‘1’ and any other answer (*i.e.* ‘Neutral’, ‘Agree’ and ‘Strongly Agree’) will be grouped as the 2nd cumulative split and will be coded as ‘0’. In other words, probability of receiving the answer ‘Strongly Disagree’ OR ‘Disagree’ is coded as ‘1’ and probability of receiving the answer ‘Neutral’, ‘Agree’ and ‘Strongly Agree’ will be coded as ‘0’. In the same manner, category 3 and 4 were created.

The following table displays how the dichotomous dependent variables were created based on the cumulative splits of the ordinal dependent variable, (*i.e.* the human resource information system enabled human resources practices and HRM performance), measured on a 5-point scale:

Table 5.6 - Dichotomous variables based on cumulative splits of the categories of the ordinal dependent variable

	Dichotomous variables (Questions 1 to 5)	Coded “1” if ...	Coded “0” if ...
1	Cat1	Probability (cat. ≤ 0) <i>e.g. “Strongly Disagree”</i>	Probability (cat. ≥ 0) <i>e.g. “Disagree”, “Neutral”, “Agree” and “Strongly Agree”</i>
2	Cat2	Probability (cat. ≤ 1) <i>e.g. “Strongly Disagree” and “Disagree”</i>	Probability (cat. > 1) <i>e.g. “Neutral”, “Agree” and “Strongly Agree”</i>
3	Cat3	Probability (cat. ≤ 2) <i>e.g. “Strongly Disagree”, “Disagree” and “Neutral”</i>	Probability (cat. > 2) <i>e.g. “Agree” and “Strongly Agree”</i>
4	Cat4	Probability (cat. ≤ 3) <i>e.g. “Strongly Disagree”, “Disagree”, “Neutral” and “Agree”</i>	Probability (cat. > 3) <i>e.g. “Strongly Agree”</i>

The above dichotomous variables were then recorded in the IBM-SPSS system. If the ordinal logistic regression analysis predicts that each independent variable has a significant effect on the dependent variables, provided that (a) there is no multicollinearity, (b) there are proportional odds, and (c) the model meets the model-fit requirements (Laerd Statistics, 2015), then it can be determined which independent variable has the significant effect on which dependent variable category.

The chapter on data analysis will discuss in detail of employing this proportional odds model (POM) in ordinal logistic regression.

5.5 Conclusion

This chapter started by explaining the research design by four main research terminologies composed by Easterby-Smith, *et al.* (2008), namely, ontology, epistemology, methodology, and methods, and their relevance to this research. By nature, this study is quantitative research that comes under the relativist epistemological assumptions and therefore assumed the deductive theory approach. According to Bryman and Bell (2007), there are six major steps that guide a deductive theory approach, they are, conceptualize a theory, formulation of hypotheses, data collection & analysis, findings, hypotheses confirmed or rejected, and revision of theory. The findings in the data analysis section will decide whether the hypotheses is confirmed or rejected, and from these results the researcher will revise the conceptual theory.

Furthermore, this chapter also discussed the data analysis of this research that is based on two known approaches, namely, Kendall's tau-b correlation and OLR. While Kendall's tau-b will be used to measure the strength of relationship between HRIS-enabled HR practices and the HRM performance, ordinal logistic regression will be used to predict the belief that the organization type and organization size impact the HRIS enabled HR practices. Next, Chapter 6 will look specifically at subjects within the research methods.

Chapter 6

Research Method: Subjects

This chapter contains detailed information about the sampling method that is used in this research, as well as the rationale for this choice. Collecting a sample is always a challenge for researchers orchestrating a quantitative survey approach. One of the main reasons for this is, “*The trustworthiness of the evidence base for decisions depends on many factors*”, maintain Easterby-Smith, *et al.* (2008, p.212). These factors can be stated as, population and sample, sampling design, selection process, sample size and response rate (Creswell, 2003). The sections below discusses how these factors were approached in this study.

6.1 The population and sample

To begin with, it is important to distinguish between population and sample. While the population refers to the whole set of entities that research decisions relates to, the sample refers to a subset of those entities from which evidence is gathered (Easterby-Smith, *et al.*, 2008). Easterby-Smith, *et al.* (2008, p.212) state, “... *the purpose of collecting data from a sample is to enable the researcher to make statements about the population that the sample is drawn from.*” Wetcher-Hendricks (2011) confirms that the sample is the ‘*miniature*’ of the population.

In this research, the target population is human resources professionals who have access to human resource information systems (HRIS) within their organization in a Canadian context. The reasons for restricting the population and the sample to Canada are:

4. As it was learned from the literature reviews in the previous chapters, there is no study involving the Canadian context that addresses ‘HRIS-enabled HRM performance’ from the business process management (BPM) perspective.
5. Since this is a single-researcher study with a strict timeline and resources restriction, data collection was more practical and accessible within a specific context.
6. The researcher is a Canadian citizen who has an extensive work experience and familiarity within the Canadian work settings. Therefore, his level of understanding of the main research constructs such as information communication technologies (ICT) and human resources management within Canadian context is considerably practical and reasonable.

6.2 The sampling design

Samples for a study can be accessed via many methods, such as simple random sampling, stratified random sampling, systematic random sampling, multi-stage sampling, convenience sampling, quota sampling, purposive sampling, and snowball sampling (Easterby-Smith, *et al.*, 2008). Given the requirements defined by the research questions and the hypotheses, this research is adopting the ‘purposive sampling’ method. That is, “*in this method (i.e. purposive sampling) the researcher has a clear idea of what sample units are needed, and then approaches a potential sample members to check whether they meet eligibility criteria*” (Easterby-Smith, *et al.*, 2008. p.218). On the same note, Wetcher-Hendricks (2011, p.342) informs that ‘purposive sampling’ method as “*Reasons why specifically chosen subjects were needed and where, when and how subjects were obtained*”. As defined by Easterby-Smith, *et al.* and Wetcher-Hendricks, the researcher had a clear idea of the samples (*i.e.* HR professionals), why these samples were selected (*i.e.* because they are the ones dealing with human resources information systems), and where, when and how these samples were obtained (*i.e.* within Canadian context).

The sampling design involves the following aspects (Easterby-Smith, *et al.*, 2008)²:

1. Representativeness: The accuracy of conclusions drawn from a sample depends on whether it has the same characteristics as the population from which it is drawn. One of the key ways of judging the representativeness of a sample is to compare the characteristics of the sample to those of the population.
2. Improving response rate in surveys: A high response rate in a survey is very important because it gives a larger body of data that can be used to come to a conclusion. Also this makes it much more likely that the sample is representative of the population of interest.

Here are a few important steps that a researcher can take to increase response rates:

- Make the task easy and short
- Explain the purpose clearly, so that respondents can see its value
- Give incentives to take part
- Give assurance of confidentiality and anonymity
- Send out reminders

² Please be informed that the sampling design aspects listed here are directly quoted from (unless otherwise explicitly mentioned) the book *Management Research* by Easterby-Smith, *et al.* (2008). Therefore, it should be noted that the reference to the book in this section is collective thus there is no individual reference made to these aspects in the body of this section.

3. Precision in sampling – sampling proportion and sampling size: Precision is about how credible a sample is. '*The precision in sampling has nothing to do with the size of the population but rather depends on the size of the sample. Small samples will always be less precise than large samples*', confirms (Easterby-Smith, *et al.*, 2008, p.215). However, in a single-researcher study, obtaining a large sample is challenging. Therefore, in this study, as Easterby-Smith, *et al.*, (2008, p.215) suggest, combining precision and representativeness to obtain a credible sample size was an appropriate alternative.

Further discussion on the above three aspects will be conducted in the sections below. The next section discusses the sample selection methods used by the researcher.

6.3 Sample selection process

Given the nature of a quantitative opinion survey as the data collection method in this research, the researcher attempted two unsuccessful moves before settling with a viable solution to choose the sample and its size.

6.3.1 First Attempt

Paying attention to suggestions made by Easterby-Smith, *et al.*, (2008) on purposive sampling, the researcher initially decided to undertake a social media sample selection approach. Rowlands *et al.* (2011) suggest that social media tools allow researchers to collect information from wide variety of sources and to listen to 'different voices'. In line with this suggestion, this study started an approach to collect samples from the leading professional social media called LinkedIn and its groups focused on Canadian HR professionals.

LinkedIn.com is one of the world's largest professional social network with 225 million members in over 200 countries and territories around the globe (LinkedIn.com, 2013). It aims to connect the world's professionals to make them more productive and successful. When someone joins LinkedIn, he or she gains access to contacts, jobs, news, updates and insights that help member interact easily within their industry and cross-linked industries. Like-minded members within LinkedIn forms their own groups, usually professional groups based on their job and academic category to share knowledge, experience, updates and job opportunities.

By taking the advantages of these groups, this researcher decided to approach the following HR groups as samples to collect data within Canada:

- **CHRP** – A private LinkedIn network for Canadian HR Professionals. This group has 6,265³ members (LinkedIn Group 1, 2008).
- **HRPA members** – The Human Resources Professionals Association (HRPA) is Canada's HR leader with over 20,000 members in Canada. This group has 10,347 members (LinkedIn Group 2, 2008).
- **Canada Human Resources Network** – A resource for HR professionals across Canada to network, share HR industry job postings, HR job leads and HR related resources. This group has 5,437 members (LinkedIn Group 3, 2008).
- **HR Professionals – CANADA Chapter** – This is a geographical group for HR Professionals working on recruitment, competence management, consulting, *etc.*; both supply and demand side. This group has 2,731 members (LinkedIn Group 4, 2008).
- **BC HRMA – BC Human Resources Management Association** – BC Human Resources Management Association (BC HRMA) is a source for Human Resources information and services in the province of British Columbia, Canada. This group has 4802 members (LinkedIn Group 5, 2008).
- **HRIA - Human Resources Institute of Alberta** – The Human Resources Institute of Alberta (HRIA) is the professional voice of human resources practitioners in in the province of Alberta, Canada. This group has 2709 members (LinkedIn Group 6, 2011).

Once the researcher started do study the nature of these groups, he found out that there were two major issues in collecting data from aforementioned LinkedIn groups. They were:

1. **The trustworthiness of the evidence base:** Even though each of the above groups have their own members, it is very apparent that most of these members have membership in more than one group. Therefore, it would be possible that one member might get more than one invitation to participate in this survey and complete the survey more than once, a typical form of ballot box stuffing.
2. **Contacting the group members:** It was learned that these groups were formed by individuals and that they have exclusive control over distribution of information to their members. Without these group owners' approval contacting the members was nearly impossible. The researcher sent out repeated requests to these so called group owners but was unsuccessful in getting a positive response in order to contact the samples.

³ These numbers were obtained at the time of access and may vary at the present time.

Because of the above reasons, the researcher decided not to proceed in this direction to collect the data.

6.3.2 Second Attempt

The second attempt was made to contact the members of the human resources professionals association (HRPA). The Human Resources Professionals Association (HRPA) is the professional regulatory body and the professional association for Human Resources professionals in Ontario, Canada. It oversees more than 20,000 members in 28 chapters across the province (www.hrpa.ca). The researcher approached the official at HRPA to learn about the possibility of obtaining a list of its members for the purpose of conducting the survey. It was learned that there was a hefty payment involved in obtaining the contact list of HRPA members and that amount was not affordable to the researcher. Therefore, this line of thought also was given up.

6.3.3 Third Attempt

Finally the researcher had to settle with contact list obtained from a third party called 'ProspectCloud' (www.prospect-cloud.com). 'ProspectCloud' introduces itself on its LinkedIn page as (LinkedIn.com, 2015):

ProspectCloud is a trusted provider of leading business data with access to 50 million direct contacts with email. ProspectCloud helps clients build highly focused B2B email marketing lists of decision makers for sales and marketing outreach, lead nurture and drip campaigns. Clients are attracted to ProspectCloud for its' complete, accurate and highly vetted data and on demand quality and vetting process and removal of bad data.

'ProspectCloud' is located in Saratoga Springs, NY. A comprehensive review was made to study the credibility of this provider. The reviews assured that the source is a reliable one with good name in the industry. Furthermore, the researcher made a direct contact with Mr. Brad Segal, the VP of Sales and Marketing at 'ProspectCloud' to ensure that the data obtained is legal and credible. As a precautionary measure, a detailed affidavit that was signed by Mr. Segal was obtained (this affidavit is attached in the 'Appendix F'). The affidavit assured the following in writing:

ProspectCloud's Quality Process: Below is an outline of the steps taken to vet the contact list and remove bad contacts prior to delivery of the list. These measures typically result in 95% of greater email accuracy.

- i. **Sourcing:** All contacts are in HR roles within Canadian organizations, as defined in the List Insertion Order.
- ii. **Purging of personal email addresses:** List includes only direct email address for the HR decision maker at the place of business.
- iii. **Purging of generic/role email addresses:** List does not contain any personal email addresses that are not practical to vet, or that may be outside of a Canadian business environment.
- iv. **Mail Exchange Verification:** An electronic process to verify the mail exchange of the organization, and the first step in cleansing of inactive email addresses.
- v. **Username/Email Verification:** A proprietary process to test email addresses for validity following the Mail Exchange Verification, and identify failures.
- vi. **Bounce Removal:** Email contacts flagged as bad are removed from the contact list.
- vii. **Deliverability testing:** Prior to delivery, the list is randomized and a sample set representing 10% of the contact list is sent an email to test both deliverability and failures rates, and to ensure the list meets the 95% email deliverability guarantee.

To obtain this list, the researcher had to pay CAD 500.00. This list contained 750 names of individuals, their title, company name and email addresses, all are Canadian HR professionals.

The adoption of email as a data collection method has both advantages and disadvantages. Sheehan and Hoy (1999) state that “Using e-mail as a survey data collection method comparable to postal mail may ameliorate some of the issues inherent in web page-based data collection”. Sheehan and Hoy (1999) further list the following as the advantages of using email as a data collection method:

- **Penetration of E-mail:** Worldwide email use continues to grow over the period of time. In 2015, the number of worldwide email users will be nearly 2.6 billion (The Radicati Group, 2015). “The sheer number of individuals using the medium coupled with the frequency and ease with which they could be contacted suggest that e-mail is a viable survey method” confirms Sheehan and Hoy (1999).

- **Anonymity and Confidentiality:** *“With e-mail surveys, anonymity could be guaranteed through the use of encryption technology, and confidentiality can be guaranteed through confidentiality assurances”*, maintains Sheehan and Hoy (1999)
- **Cost Benefits:** *“Cost savings from e-mail compared to traditional mail and telephone surveys are based on low transmission costs and elimination or reduction of paper costs”*, informs Sheehan and Hoy (1999).
- **Ease and Flexibility of Responding:** *“As more people become familiar with the Internet, these individuals should become comfortable using the technology to answer surveys”* predicts Sheehan and Hoy (1999).
- **Response Time Benefits:** The study by Sheehan and Hoy (1999) suggests that data can be collected more quickly using e-mail when compared with postal mail methods.

The disadvantage of collecting data using email can be listed as:

- the respondents may consider unsolicited surveys as aggressive and not in alignment with internet culture and
- the changing nature of internet culture suggests that the email addresses initially obtained may become quickly invalid (Sheehan and Hoy, 1999).

6.4 Sample size

Obtaining the right sample size was one of the major challenges faced by the researcher during the data collection stage. In other words, determining the exact number of HR professionals within Canadian context or identifying the list of units within the population was not easy. This was because:

- (a) there were many HR professional associations found at the national and provincial levels, but there is no single reliable body that definitively give the exact number of HR professionals in Canada,
- (b) even though these bodies proclaim their membership totals, there was a high possibility that many HR professionals could not register with these bodies,
- (c) there was the possibility individuals had membership in more than one association provincially and nationally, and
- (d) new members are added to these association constantly.

Even though the determining the exact number of HR professionals in Canada is not very feasible, the number of Certified Human Resources Professional or **CHRP** title holders, a

designation achieved by Human Resources professionals in Canada gives us a clue. According to human resources management association (HRMA) website (HRMA – CHRP, 2015), there are more than 25,000 CHRP holders across Canada. Therefore, based on this information, one can safely assume that the population count for this study is at least 25,000.

For the same reasons mentioned above, establishing the sampling frame, the listing of all units (in this case, the unit can be considered as ‘provinces’ or HR management sectors) in the population from which the sample was selected (Bryman and Bell, 2007) was not possible. In addition, by nature, this study is not particular to any region in Canada or any HR management sector. Therefore, the provinces or HR management sectors as units were not taken into consideration and the sampling frame was defined to one unit, namely ‘Canadian context’.

Another important aspect in selecting the sample size is giving close attention to ‘biases’. A biased sample is one that does not represent the population from which the sample was selected (Bryman and Bell, 2007 and Easterby-Smith, *et al.*, 2008). The list of contacts of HR professionals within the Canadian context obtained from ‘ProspectCloud’ contained 750 names, email addresses and other relevant details. Even though it was guaranteed by the provider under the ‘Sourcing’ section above that the contacts were all HR professionals in Canada, the researcher was skeptical about this claim. After careful inspection of the list, about 298 names were removed from the list for their non-compatible HR roles. This is because the contacts were mislabelled as HR professionals but their ‘job titles’ were described as some other organizational roles, such as VP sales, Director of IT, Head of Marketing, *etc.* A through search on randomly selected samples of these 298 ‘mislabelled’ contacts were done on the website and LinkedIn profiles. The search revealed that these contacts’ roles were incorrectly included in the list obtained from ‘ProspectCloud’. Since these contacts were confirmed as non-HR professionals, in order to assure the representativeness and avoid bias, these 298 names were removed from the list. This led to a sample size of 452 (*i.e.* $750 - 298 = 452$). This is approximately 2% of the total population, and considered to be low in precision.

As discussed in the previous section the population of this study was defined as HR professionals within Canadian context. Precisely, the drawn samples from this population are relatively homogeneous, that is, the samples are specific to one category of work or company, namely HR professionals within Canadian context. In short, the bias is low, hence, a small sample size would be acceptable (Bryman and Bell, 2007, p.196). To be sure, as Easterby-

Smith, *et al.* (2008) suggest, the decision to undertake an approach by combining precision and representativeness to obtain a credible sample size was made.

Easterby-Smith, *et al.* (2008, p.215) suggest the following table to determine the sample size that represents the population:

Table 6.1 - Determining sample size (Easterby-Smith, *et al.*, 2008, p.215)

		Bias	
		High	Low
Precision	High	Precisely wrong	Precisely right
	Low	Imprecisely wrong	Imprecisely right

Easterby-Smith, *et al.* (2008, p.215) further explain this table as, “*Low bias means that the conclusions from a sample can safely be applied to the population, and high precision means that the margin of error in the claims that are made will be low, therefore, the researcher can expect to be ‘Precisely right’*”. They argue that when comparing ‘imprecisely right’ and ‘precisely wrong’, ‘imprecisely right’ is better, because, “... *it is preferable to have a sample that properly represents the population even if the precision is lower because of a small sample*”.

Now in this study, the precision and the bias are both low. This is an exact situation that was discussed above, that is, the sample size in this study is ‘imprecisely right’ therefore, acceptable. In conclusion, by considering the statements from Bryman and Bell (2007) and Easterby-Smith, *et al.* (2008), the researcher is convinced that the sample size in this survey is appropriate.

6.5 Response rate

Response rate is crucial in determining the representativeness and the validity of the survey. However, Bryman and Bell (2007, p.245) declare that if the samples are not selected on the basis of probability sampling, response rate is less of an issue. Despite this argument, Bryman and Bell (p.245) strongly maintain that “... *the lower the response rate, the more questions are likely to be raised about the representativeness of the archived sample*”. Therefore, even though the samples in this study were categorized as ‘purposive sampling’, the researcher is inclined to conduct a response rate analysis to ensure the representativeness and validity of the survey.

Bryman and Bell (2007, p.196) inform that the response rate is the percentage of a sample that does agree to participate in the survey. They further add that,

“However, the calculation of a response rate is a little more complicated than this. First, not everyone who replies will be included: if a large number of questions are not answered by a respondent or if there are clear indications that he or she has not taken the interview or questionnaire seriously, it is better to employ only the number of ‘usable’ interviews or questionnaires as the numerator. Similarly, it also tends to occur that not everyone turns out to be suitable or appropriate respondent or can be contacted. Therefore the response rate is calculated as follows:

Response rate =	$\frac{\text{Number of usable questionnaire}}{\text{Total sample} - \text{Unsuitable or uncontactable members of the sample}}$	X 100
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Figure 6.1 - Response rate calculations

Since we have already confirmed the total sample size as 452 in the ‘Sample size’ section, we now need to know the usable sample size (*i.e.* unsuitable or uncontactable members of the sample subtracted from total sample) and the usable responses (also called number of usable questionnaire) to calculate the response rate. The following paragraphs describe how these two numbers were obtained.

In order to identify the usable sample size from the actual valid sample size we need to calculate the ‘non-response’ number. Bryman and Bell, (2007, p.182) describe non-response as, “*a source of non-sampling error that is particularly likely to happen when individuals are being sampled. It occurs, whenever some members of the sample refuse to cooperate, cannot be contacted, or for some reason cannot supply the required data*”. Taking the lead from this statement, the number of ‘non-responses’ was calculated in three categories; one is samples that were not be able to be contacted, the second was the samples that deleted the survey request emails without reading them and third was the samples that read the survey request emails but did not bother to respond to the survey. The total number of non-responses will be calculated by adding these three categories. Recall, in this study, the valid sample size was 452 derived after removing the non-compatible HR role contacts from the actual list obtained from ProspectCloud. That is, the valid sample size = actual contacts from the ProspectCloud list - non-compatible HR role contacts (*i.e.* 750 – 298 = 452).

(a) Non-responses: Samples cannot be contacted

When the survey started, that is, the respondents were contacted via emails, totally 66 emails were returned with ‘Delivery Failure’ tag. As a result, it was safely assumed that

these individuals were no longer functioning as HR professionals in these organizations, therefore, considered as ‘uncontactable samples’. This decision led to a list of remaining contacts with 386 usable samples (*i.e.* $452 - 66 = 386$).

(b) Non-responses: Samples that deleted the survey request emails without reading

As a result of enabling ‘Request delivery and read receipts’ mechanism within MS-Outlook, the researcher was able to track that there were 76 individuals that did not open the survey request emails and deleted them without reading. These samples, therefore, were considered ‘members of the sample refuse to corporate’. As a result, the remaining list of usable sample size shrunk to 310 (*i.e.* $386 - 76 = 310$).

(c) Non-responses: Samples that read the survey request emails but did not respond

Finally, based on the email tracking mechanism, the researcher found out that there were 116 sample those who were asked to attend the survey read the survey request emails but did not attempt to respond to the survey. These samples, therefore, were considered samples that were ‘for some reason cannot supply the required data’. As a result, the list of usable samples further shrunk to 194 (*i.e.* $310 - 116 = 194$).

To finalize the actual non-response number, we need to add these three values, that is, the values from (a), (b) and (c).

Thus, Non-responses = $66 + 76 + 116 = 258$, and members were labelled as ‘unsuitable or uncontactable members of the sample’ (Bryman and Bell, 2007). In other words, the usable sample size is now equal to Valid Sample size – Non-responses.

That is, in this context the usable sample size = $452 - 258 = 194$

Next, the number of usable responses must be determined. The survey results show that there were 54 samples that did not make the final ‘usable responses’ list. The reasons for this was that they were deemed ineligible due to screening questions and/or they produced incomplete surveys.

The eligibility of the samples was ensured by the screening section of the survey that contained three questions. The questions were asked to ensure the following conditions and anyone who responded ‘No’ to these questions were deemed ineligible and thus barred from continuing the survey:

- (a) the respondents were HR professionals,
- (b) they function from Canada, and

- (c) there was at least one human resource information system (HRIS) implemented in the organization.

After completing the screening section of the survey, 47 samples were made to leave the survey due to not meeting the requirement listed above, thus 147 remained in the survey to continue.

Another seven respondents were removed during the personal and organization information section. In this section samples were asked questions such as job title, organization type, organization size, locations, *etc.* In this section seven members answered few of the questions but stopped completing the survey. These seven incomplete respondents also were removed from the final list of usable responses. Eventually, there were 140 respondents who continued and completed the survey (*i.e.* $194 - 47 - 7 = 140$).

Recall the response rate formula derived earlier in this section in Equation 6.1. In this study the usable responses is 140 and usable sample size (*i.e.* total sample - unsuitable or uncontactable members of the sample) is 194, thus the:

$$\text{Response rate} = (140 / 194) \times 100 = \mathbf{72.2\%}$$

Bryman and Bell, (2007, pp.244 & 245) referring to Mangione's classification, suggest that response rate between 70% and 85% is considered 'very good'. Therefore, in this study, the response rate **72.2%** validates the survey in terms of sample representativeness.

6.6 Conclusion

This chapter started by discussing the population and sample. In this research, the target population is the human resources professionals who have access to HRIS within their organization in Canadian context. The main reason for this selection is that since there was no BPM focused studies done from the HRM and ICT perspective, especially within Canadian context, choosing HR professional with HRIS exposure as the population allowed the researcher to study this unexplored subdomain of BPM. It is also justified that since this is a Canadian single-researcher, with a strict timeline and resources restriction, data collection would be more practical and accessible within the Canadian context.

Given the requirements defined by the research questions and the hypotheses, this research is adopting the 'purposive sampling' method. In this study the researcher has a clear idea of who the samples (*i.e.* HR professionals), why these samples were selected (*i.e.* because they are the ones dealing with human resources information systems), and where, when and how these

samples were obtained (*i.e.* within Canadian context). Finally in this chapter, valid sample size was determined as 452 and the response rate at 72.2%; both vales are considered to be appropriate for this study. In the following chapter, the research method measures will be explored in detail.

Chapter 7

Research Method: Measures

Deciding on an appropriate data collection design was the next challenge faced by the researcher. A data collection design primarily depends on the research strategy. As discussed in the ‘Research Methodology’ section, this study uses a deductive theory approach that leads to the testing of a theory (or theories) based on relativist epistemological assumptions, therefore, this study is considered to be a quantitative research strategy. Wetcher-Hendricks (2011, p. 342) informs that there are four data collection techniques (designs) in quantitative research. They are; observation, survey, experiment and existing sources. This study employs the survey technique for data collection by commissioning samples to take a survey. This chapter describes the data gathering design adopted in this study by focusing on the survey design, instrumentation, and the questionnaire design.

7.1 The survey design

The survey approach is one of the well-known research methods in quantitative studies that is employed to collect data from selected sample. Creswell (2003) maintains that *“a survey design provides a quantitative or numeric description of trends, attitudes, or opinions of a population by studying a sample of that population. From sample results, the researcher generalizes or makes claims about the population”*. While agreeing with this statement, Easterby-Smith, *et al.* (2008, p.90) connect their view on survey method to epistemological assumptions and explain: *“since the (relativist) research involves multiple factors, and needs to make approximation of reality, relatively large samples are usually required, and hence surveys are the preferred methodology in this area”*.

The purpose of the survey design is twofold: (1) collecting empirical (primary) data to test the hypotheses formulated in the previous chapter, and (2) validating the new conceptual model. To fulfill this purpose, the survey design process started with the identification of the data collection method. There are two broadly used quantitative data collection methods mentioned by Easterby-Smith, *et al.* (2008, p.219):

1. *The researcher collects his or her own primary data.*

2. *The researcher can use the secondary data already collected and stored within archival databases.*

Professed as a relativist epistemological research, that is, research dealing with two theories and multiple variables for a given time frame, the need for choosing the appropriate data collection tool was vital to this study. At the early stages of the data collection process, reference to 'a checklist of questions for designing a survey method' (supplied by Creswell, 2003, p.155) was instrumental in designing the survey for this study (see 'Appendix A').

Since the focus of this study (*i.e.* 'HRIS-enabled HRM performance model' in view of business process management) is a fairly new area of research that is not found in any existing literature, this author espoused the primary data collection method by employing a cross-sectional survey design.

Bryman and Bell, (2007, p.55) explains the cross-sectional research design as "*A design entails the collection of data on more than one case (usually quite a lot more than one) and at a single point in time in order to collect a body of quantitative or quantifiable data in connection with two or more variables (usually many more than two), which are then examined to detect patterns of association*".

Now, since the data collection design of this survey is determined as cross-sectional research design, it is also important to address the three research evaluation criteria, namely, reliability, replicability and validity from the cross-sectional perspective. The source of each of these criteria discussions conducted below is attributed to the details in the book by Bryman and Bell (2007).

1. **Reliability:** As it was described in detail in the research methodology section, reliability is connected to the question whether the results of the study can be repeatable. In other words, reliability refers to the consistency of a measure of a concept (Bryman and Bell (2007, p.163). The results of this study will be tested for its reliability later in this research thesis by employing 'Cronbah's alpha test'.
2. **Replicability:** Replicability is the validation criteria that happens when someone else in the future decides to use the results of this study for his or her research work. There can be many reasons for this, such as the original results might have ignored certain important aspects of the concept, therefore it is this researcher's responsibility to clearly spell out the procedures taken to collect and analyse the data in detail for the future

researchers (Bryman and Bell, 2007, p.58). For this reason, this study provides the data gathering and data analysis procedures in detail in this thesis.

3. **Validity:** Validity is concerned with the integrity of the conclusions that are generated from this research. There are four types of validity such as measurement validity, internal validity, external validity and ecological validity (these validities were discussed in detail in Chapter 8 of this thesis). From the cross-sectional research perspective, measurement validity, internal validity and external validity are the ones that must be taken into consideration (Bryman and Bell, 2007).

Parallel with 'reliability' discussed above, measurement validity also is connected to the question whether the results of the study can be repeatable. There will be discussions later in this thesis on reliability and measurement validity to test the repeatability of the results of this study.

Internal validity is concerned with causal relationship between two variables in the research. Since cross-sectional research design usually focusses on associations rather than findings from which causal inferences can unambiguously made, establishing causal directions from the resulting data is difficult. Therefore, the measure of internal validity is typically weak in cross-sectional research design (Bryman and Bell, 2007).

External validity is connected to whether the results of a research project can be generalized beyond the specific context. In cross-sectional research design, usually the external validity is strong, assures Bryman and Bell (2007). In this study, the researcher is focused on finding a relationship between information communication technology (ICT) and the performance measures of business process management. For this reason, he has chosen human resources information systems (HRIS) and human resources management (HRM) performance as the testing grounds. Since, HRIS and HRM performance are the sub-sets of ICT and BPM performance respectively, the researcher is strongly in the opinion that the findings established in this study can be generalized to the other sub-sets of ICT and BPM.

The survey data can be collected through several ways, such as postal questionnaire survey, structured-interview survey, telephone interview survey and web-based (or internet) survey (Easterby-Smith, *et al.*, 2008). In the modern research world, collecting data by creating a web-based survey and administering it online (Nesbary, 2000) has become commonplace (Easterby-Smith, *et al.*, 2008). In web-based survey, the questionnaire is set up on the website and the

potential respondents are sent the web address to access and complete the survey. This survey approach has its own advantages. Easterby-Smith, *et al.* (2008, p.220) state the advantages of web-based survey as:

1. Cost effectiveness
2. Ease of use with without technical training, *e.g.* Ready-to-use web-based surveys
3. Customizability for individual respondents
4. Interactivity enabled by new web technologies, such as pop-up or drop-down instructions, skip-logic and conditional branching, and relating current question to earlier questions.
5. Dynamic error checking
6. Ease of analysis, *e.g.* Collected data can be downloaded directly into analysis programs such as Excel or SPSS

Considering the above advantages and the nature of this research, a web-based cross-sectional field survey of HR professionals within Canadian context was employed.

7.2 Instrumentation

Selecting the right survey tool is the next important component of data collection. As indicated earlier, the survey method is a web-based one. A careful investigation was conducted to choose the appropriate online survey tool available. The well-known online survey tools such as, 'Survey Monkey', 'Zoomerang', 'Fluid Surveys', 'Simple Survey', 'Lime Survey', 'Key Survey', 'QuestionPro' and 'Novi Survey' were taken into consideration. Despite the fact that some of these survey tools offer free versions of their products with limited functionality the researcher was concerned about these limitations. Specifically, limitations imposed by these free versions of the survey tools such as limit on number of potential respondents, branching and piping were considered a disadvantage for conducting the survey for this study. Therefore, the researcher decided to purchase a cost-effective survey instrument.

With maintenance of the rigorousness in this research's data collection and cost effectiveness in mind, an online survey tool called 'Novi Survey' was selected. Novi Survey not only has a good rapport among the academic circle, but also is known for its affordability, functionality

and user-friendliness. In particular, as listed by on its website, Novi Survey offers the following features for a nominal price (Novi Survey, 2015):

- More than 75 survey questions variation
- Very powerful yet very easy to use
- Respondents portal for online surveys and reports
- Conditional survey logic with branching and skipping
- Compound multi-level survey page conditions
- Advanced email invitation engine with message tracking
- Customizable look and feel with built-in & custom templates
- Question libraries to store and reuse survey questions
- Real-time survey response browsing and reporting

A questionnaire based on the research question and hypotheses was prepared and discussed with the supervisor and the local adviser of this researcher. With minor suggestions and modifications, a final survey questionnaire was adopted (attached as ‘Appendix B’). Then this survey questionnaire was uploaded to one of the very practical templates in Novi Survey.

7.3 The survey questionnaire design

Designing an effective survey questionnaire is necessary for success in the cross-sectional research method. In this study, a set of closed-ended survey questions were designed to collect the primary data. As suggested by Easterby-Smith, *et al.* (2008, p.227-228), the following five important conditions were given careful attention when designing the survey questionnaire:

1. Each question should express only one idea
2. Avoid jargon and colloquialism
3. Use simple expressions
4. Avoid the use of negatives
5. Avoid leading questions

Collectively, the set of questions formed for this study met the above conditions. However, there were a few jargon terms that are related to the concepts of HR practices and HRM performance such as transactional practices, traditional practices, transformational practices, employee presence, *etc.* that had to be used in the survey because, these terms are unique to human resources management. That said, since the target samples in the study were all carefully

selected HR professionals, these specific words were considered familiar ones to the respondents.

As mentioned above, this survey was designed to collect data from closed-ended questions. In closed-ended questions the researcher sets up the questions in such a way that respondents must select the pre-coded answers from a given list. Cognisant of the disadvantages of using closed-end questions in a survey, such as loss of spontaneous responses, bias in answer categories, sometimes too crude in nature and may irritate the respondents, the reasons for choosing closed-ended questions in this survey were (Vinten, G, 1995, pp.27-28):

- (a) They are easy to handle*
- (b) Cost less to administer and process*
- (c) Take less response time*
- (d) No extended writing*
- (e) Reduce and sometimes eliminate coding time*
- (f) Make group comparisons easy*
- (g) Useful for testing specific hypotheses*

In addition, when designing the survey, the length and conciseness of the respondents needs to be given importance, because these two factors directly impact the response rate. Bender and Westphal (2006) maintain that individuals who receive a survey analyze the costs and benefits of participation. Lengthy surveys take more time and effort to complete thus will be considered more costly to potential respondents than shorter questionnaire; in other words, longer questionnaires tends to produce lower response rate (Yammarino, Skinner and Childers, 1991; Jobber and Saunders, 1993). Also, longer surveys may pressure the respondents to give hurried and less reliable answers, confirms Bender and Westphal (2006). ‘Survey Monkey’, a leading online survey tool provider’s analysis shows that “... *survey abandon rates increase for surveys that took more than 7-8 minutes to complete*” (Survey Monkey, 2011). The average time taken to complete the survey in this study was about 6 minutes. Therefore, regardless of the fact that there were 54 respondents who started the survey but did not complete it (this includes 47 respondents who were screened out by the eligibility questions), the time taken to complete the survey in this study can be considered reasonable and having met expectation.

Measurement scales were the next important aspect in designing the survey questions. Easterby-Smith, *et al.* (2008) state that there are two kinds of measurement scales researchers commonly use in the quantitative studies. These scales are, category scales and continuous scales. While

continuous scales are strictly ordered scale, category scales can be either ordered (also called 'ordinal') or unordered (also called 'nominal') scales. Easterby-Smith, *et al.* (2008, p.228) further explains the characters of these scales as follow:

"Nominal scales have no natural ordering ... e.g. White, Black, Asian, Chinese, and Other. It makes no sense to treat a concept like ethnic origin as anything other than a nominal scale since the five ethnic groups could equally well be written in any order. ... By contrast, ordinal scales have natural ordering, e.g. Likert scale with five levels such as, Strongly agree, Agree, Not sure, Disagree and Strongly disagree".

This survey's questions were exclusively designed based on the 'category scales'. The questions were both nominal and ordinal. While the screening question and the personal and organization information collection sections were unordered nominal category scale, the hypotheses testing questions were based on the six-point Likert scale ordinal category scale.

As described above, the screening section questions, *i.e.* the first three questions of the questionnaire, were placed to determine the eligibility of the participant with 'Yes' or 'No' type of nominal scale category questions. The next five questions in the personal and organizational information collection section were designed with a set of unordered answers (nominal) on category scale, for example organization type as 'government', 'private', 'semi-government', 'NGO' and organization size as 'less than 500', 'between 500 and 5000', 'more than 5000', and so on. The final fifteen questions were set up with an ordinal category scale to test the hypotheses on a six-point Likert scale with 'strongly agree', 'agree', 'neither agree nor disagree', 'disagree', 'strongly disagree' and 'these activities are NOT supported by the current HRIS in my organization' options. Once the survey was collected, during the data clean-up stage, the researcher felt that the value of the Likert scale option 'these activities are NOT supported by the current HRIS in my organization' was somewhat similar to the option 'neither agree nor disagree'. Therefore, after a comprehensive discussion with his supervisor and the local advisor, the researcher decided to collapse both sets of data to 'neutral' in the Likert scale. The data collected for hypotheses testing were conducted with specific questions in the questionnaire.

A survey questionnaire with 23 closed-end Likert scale type questions was designed to collect the empirical data for this study. Influenced by the survey structure Ravesteyn and Batenburg (2010), the survey questionnaire in this study was designed according to the structure given below:

1. Screening questions:

There were three questions that would test the eligibility of the respondents. These questions were asked to make sure that the respondents were HR professionals, the respondents were working in Canada, and there is at least one HRIS implemented in the respondents' work settings. As discussed in the previous chapters, these three conditions and were the vital factors that constitute this research.

2. General questions:

There were five questions concerning the respondent's job role, type of company, location of the company, number of employees (size of the company) and industry. Out of these five questions, the type and size of the company questions became instrumental in developing the hypotheses.

3. Questions on the implementation of BPM-systems (HRIS – HR practices relationship):

There were five questions to measure the impact of HRIS implementation on the HR practices. The first two questions accommodated the two HR transactional practices categories identified in the literature review section, namely 'employee day-to-day record keeping activities' and 'employee benefits administration activities'.

The third and fourth questions accommodated the two HR traditional practices categories identified in the literature review section, namely 'overall management activities related to employee recruitment, selection, training, promotion, and compensation' and 'overall employee management activities related to employee performance management, rewards, career development and communication (employee relations)'.

The fifth question accommodated the HR transformational practices category identified in the literature review section, namely 'overall employee management activities that meet strategic organizational objectives such as strategic planning, organizational development, knowledge management and change management'.

4. Questions on the BPM performance (HRIS-enabled HR practices – HRM performance relationship):

There were ten questions to measure the relationship between the HRIS-enabled HR practices and HRM performance.

The first two questions accommodated the HRIS-enabled HR transactional practices pertinent to employee day-to-day record keeping activities such as entering payroll information, employee status changes, *etc.*, to the two HRM performance measures ‘overall employee satisfaction, motivation, presence (obverse of absenteeism) and retention (obverse of turnover)’ and ‘overall employee involvement, trust, loyalty, commitment and “social climate” between workers and management’.

The third and fourth questions in this section accommodated the HRIS-enabled HR transactional practices pertinent to benefits administration activities such as administering health insurance coverage, investments, retirement programs, *etc.*, to the two HRM performance measures ‘overall employee satisfaction, motivation, presence (obverse of absenteeism) and retention (obverse of turnover)’ and ‘overall employee involvement, trust, loyalty, commitment and “social climate” between workers and management’.

The fifth and sixth questions in this section accommodated the HRIS-enabled HR traditional practices pertinent to management activities such as administering health insurance coverage, investments, retirement programs, *etc.*, to the two HRM performance measures ‘overall employee satisfaction, motivation, presence (obverse of absenteeism) and retention (obverse of turnover)’ and ‘overall employee involvement, trust, loyalty, commitment and “social climate” between workers and management’.

The seventh and eighth questions in this section accommodated the HRIS-enabled HR traditional practices pertinent to management activities such as employee performance management, rewards, career development and communication (employee relations) to the two HRM performance measures ‘overall employee satisfaction, motivation, presence (obverse of absenteeism) and retention (obverse of turnover)’ and ‘overall employee involvement, trust, loyalty, commitment and “social climate” between workers and management’.

The ninth and tenth questions in this section accommodated the HRIS-enabled HR transformational practices pertinent to strategic organizational objectives such as strategic

planning, organizational development, knowledge management, change management, *etc.* to the two HRM performance measures ‘overall employee satisfaction, motivation, presence (obverse of absenteeism) and retention (obverse of turnover)’ and ‘overall employee involvement, trust, loyalty, commitment and “social climate” between workers and management’.

The following table summarizes this design:

Table 7.1 - The survey questionnaire design

Question	Test
Question 1: The implementation of the HRIS has improved overall employee day-to-day record keeping activities such as entering payroll information, employee status changes, <i>etc.</i>	HRIS-enabled HR transactional practices
Question 2: The implementation of the HRIS has improved overall employee benefits administration activities such as overseeing the health insurance coverage, administering investment and retirement program, <i>etc.</i>	
Question 3: The implementation of the HRIS has improved overall management activities related to employee recruitment, selection, training, promotion, and compensation.	HRIS-enabled HR traditional practices
Question 4: The implementation of the HRIS has improved overall employee management activities related to employee performance management, rewards, career development and communication (employee relations).	
Question 5: The implementation of the HRIS has improved overall employee management activities that meet strategic organizational objectives such as strategic planning, organizational development, knowledge management and change management.	HRIS-enabled HR transformational practices
Question 6: The day-to-day record keeping activities, such as entering payroll information, employee status changes, <i>etc.</i> , that are supported by the HRIS have contributed to the improvement of overall employee satisfaction, motivation, presence (obverse of absenteeism) and retention (obverse of turnover).	HRIS-enabled HR transactional practices and HRM performance relationship
Question 7: The day-to-day record keeping activities, such as entering payroll information, employee status changes, <i>etc.</i> , that are supported by the HRIS have contributed to the improvement of overall employee involvement, trust, loyalty, commitment and “social climate” between workers and management.	
Question 8: The benefits administration activities, such as administering health insurance coverage, investments, retirement programs, <i>etc.</i> , that are supported by the HRIS have contributed to the improvement of overall employee satisfaction, motivation, presence (obverse of absenteeism) and retention (obverse of turnover)	

<p>Question 9: The benefits administration activities, such as administering health insurance coverage, investments, retirement programs, <i>etc.</i>, that are supported by the HRIS have contributed to the improvement of overall employee involvement, trust, loyalty, commitment and “social climate” between workers and management</p>	
<p>Question 10: The management activities of employee recruitment, selection, training, promotion, and compensation that are supported by the HRIS have contributed to the improvement of overall employee satisfaction, motivation, presence (obverse of absenteeism) and retention (obverse of turnover)</p>	<p>HRIS-enabled HR traditional practices and HRM performance relationship</p>
<p>Question 11: The management activities of employee recruitment, selection, training, promotion, and compensation that are supported by the HRIS have contributed to the improvement of overall employee involvement, trust, loyalty, commitment and “social climate” between workers and management</p>	
<p>Question 12: The management activities of employee performance management, rewards, career development and communication (employee relations) that are supported by the HRIS have contributed to the improvement of overall employee satisfaction, motivation, presence (obverse of absenteeism) and retention (obverse of turnover)</p>	
<p>Question 13: The management activities of employee performance management, rewards, career development and communication (employee relations) that are supported by the HRIS have contributed to the improvement of overall employee involvement, trust, loyalty, commitment and “social climate” between workers and management</p>	
<p>Question 14: The activities that meet strategic organizational objectives, such as strategic planning, organizational development, knowledge management, change management, <i>etc.</i>, that are supported by the HRIS have contributed to the improvement of overall employee satisfaction, motivation, presence (obverse of absenteeism) and retention (obverse of turnover)</p>	<p>HRIS-enabled HR transformational practices and HRM performance relationship</p>
<p>Question 15: The activities that meet strategic organizational objectives, such as strategic planning, organizational development, knowledge management, change management, <i>etc.</i>, that are supported by the HRIS have contributed to the improvement of overall employee involvement, trust, loyalty, commitment and “social climate” between workers and management</p>	

7.4 Conclusions

This chapter started with a discussion on survey design. Professed as a relativist epistemological research, that is, research dealing with two theories and multiple variables for a given time frame, the researcher was in the strong opinion that the need for choosing the appropriate data collection tool was vital to this study. Since the focus of this study was a fairly new area of research that is not found in any existing literature, this author was inclined to espouse the primary data collection method by employing a cross-sectional survey design.

While reliability, one of the validation criteria of a research that tests the consistency of the results, in this research will be discussed by using Cronbach's alpha test in the data analysis section, the researcher of this study wanted to document the procedures pertinent to data collection and analysis in details to assure that the level of replicability is high in this study so that enough information will be available for such future investigators. Despite the fact that the internal validity, the causal relationship, in cross-sectional research designs are usually low, the researcher is very confident that the external validity, generalization of the results of the study to beyond the research context, is very high in his research work.

The Novi Systems was selected as the survey tool in this study for its versatility in areas such as cost effectiveness, ease of use, conditional logic with branching and skipping, real-time survey response browsing and reporting and so on.

The survey questionnaire section explains the reasons for deciding the scales as categorical, specifically nominal and ordinal, in this study. Finally, a survey structure influenced by Ravesteyn and Batenburg (2010) was discussed and adopted for this study. The next chapter will focus in detail on the research methodology procedures.

Chapter 8

Research Methods: Procedures

The main purpose of Chapter 8 ‘Procedures’ is to ensure that all the steps pertinent to data collection and analysis are documented clearly and in detail. The details are important to satisfy research evaluation criteria, such as reliability, repeatability and validity (Bryman and Bell, (2007). Wetcher-Hendricks (2011, p.343) put procedure section of the report as “... *the section that provides your audience with a chronological ‘play-to-play’ of your research activities*”.

This section focuses on explaining the researcher’s actual experience in gathering data and conducting a preliminary data analysis in seven sections. These sections are the survey logic, setting up the survey questionnaire in Novi Survey, the pilot survey, preparing the mailing list, mail merge procedure in Microsoft Word, email reminders and preliminary data analysis.

8.1 The survey logic

Gathering data from the survey tool started with understanding the survey logic. In this study, the survey logic was influenced by two factors, (1) the type of survey, and (2) the variables in the research questions. As identified earlier, this study was interested in a cross-sectional survey approach that would help the researcher collect data from the HR professionals in a Canadian context. Cross-sectional surveys involved in “*selecting different organizations, or units, in different contexts and investigating how other factors, measured at the same time, vary across these units*” (Easterby-Smith, *et al.*, 2008, p.91). Knowing that cross-sectional surveys falls under inferential surveys category, determining the dependent and predictor variables (*i.e.* independent variables) was crucial at the early stages of the survey design. The values of the predictor variables are presumed causing the dependent variables (Easterby-Smith, *et al.*, 2008). In order to determine the dependent variables and predictor variables, it would be necessary to revisit the research questions and the hypotheses.

Research question 1 (RQ1): Does the HRIS-enabled HR practices (namely transactional, traditional and transformational) significantly impact the HRM Performance?

Based on the question above the below hypotheses was formed:

Hypothesis 1 (H1): HRIS-enabled HR transactional practices significantly impact the HRM Performance.

Hypothesis 2 (H2): HRIS-enabled HR traditional practices significantly impact the HRM Performance.

Hypothesis 3 (H3): HRIS-enabled HR transformational practices significantly impact the HRM Performance.

Here, the predictor variables were (a) HRIS-enabled HR transactional practices, (b) HRIS-enabled HR traditional practices, and (c) HRIS-enabled HR transformational practices. The dependent variable was HRM Performance.

Research question 2 (RQ2): Does the type of an organization significantly impacts the HRIS-enabled HR practices (namely transactional, traditional and transformational)?

Based on the question above the below hypothesis was formed:

Hypothesis 4 (H4): Organization type significantly impacts the HRIS-enabled HR practices (namely transactional, traditional and transformational).

Here, the predictor variable was organization type and the dependent variables were (a) HRIS-enabled HR transactional practices, (b) HRIS-enabled HR traditional practices, and (c) HRIS-enabled HR transformational practices.

Research question 3 (RQ3): Does the size of an organization significantly impacts the HRIS-enabled HR practices (namely transactional, traditional and transformational)?

Based on the question above the below hypothesis was formed:

Hypothesis 5 (H5): Organization size significantly impacts the HRIS-enabled HR practices (namely transactional, traditional and transformational).

Here, the predictor variable was organization size. And the dependent variables were (a) HRIS-enabled HR transactional practices, (b) HRIS-enabled HR traditional practices, and (c) HRIS-enabled HR transformational practices.

In summary, the above dependent and predictor variables of this study were tabulated as given below:

Table 8.1 - The predictor variables and dependent variables

Research Question	Predictor Variable(s)	Dependent Variable(s)
1	(a) HRIS-enabled HR transactional practices. (b) HRIS-enabled HR traditional practices (c) HRIS-enabled HR transformational practices	(a) HRM Performance
2	(a) Organization type	(a) HRIS-enabled HR transactional practices. (b) HRIS-enabled HR traditional practices (c) HRIS-enabled HR transformational practices
3	(a) Organization size	(a) HRIS-enabled HR transactional practices. (b) HRIS-enabled HR traditional practices (c) HRIS-enabled HR transformational practices

8.2 Setting up the survey questionnaire in Novi Survey

The closed-ended survey in this study was designed in three sections to collect these empirical data. They are:

- (a) Respondents' eligibility screening section
- (b) Personal and organization information collection section, and
- (c) Hypotheses testing section

Since the overall survey design was influenced by the survey logic discussed in the previous section, a clear understanding of the purposes and the design of the aforesaid sections was necessary.

- (a) Respondents' eligibility screening section: This section was designed to determine the eligibility of the respondents. There were three question in this section. The answer options

for these questions were “Yes” or “No”. If the response was “No” to any of these three questions, the respondents were deemed ineligible to continue the survey and informed of this fact. This was necessary because, as was defined earlier, the main focus of this study was to learn the association between the human resources information system (HRIS) enabled human resources practices and the human resources management performance within Canadian context, the chosen respondents must respond “Yes” each of these question to avoid the bias in sample selection. The respondents’ eligibility screening section was designed as below:

- i. Are you a HR Professional?
 - a. ‘Yes’ → Continue the survey
 - b. ‘No’ → End of Survey
- ii. Are you employed in Canada or operating from Canada?
 - a. ‘Yes’ → Continue the survey
 - b. ‘No’ → End of Survey
- iii. Do you have a Human Resource Information System (HRIS) implemented and functioning within your organization?
 - a. ‘Yes’ → Continue the survey
 - b. ‘No’ → End of Survey

Also in this section, respondents who wanted to know about human resources information system (HRIS) were given an optional button to click on to pop-up a window with following details:

A Human Resource Management Systems (HRIS) comprises the information technology and processes in conducting contemporary human resource management. This might include some or all of the following capabilities: Applicant Tracking, Recruitment, Employee Information, Benefits Administration, Benefits Online Enrollment, Employee Training Records, Employee Self Service, Employee Manager Self Service, Performance Reviews and Compensation, Reporting, Payroll, Time and Attendance,

Position Control, Government Compliance Issues, Career Development and Communication (employee relations), Strategic Planning, Organizational Development, Knowledge Management, and Change Management. Few Known HRIS are: Peoplesoft, Ascentis, TimeForce, iRecruit, Kronos, HRSofts, and HealthcareSource.

Respondents who passed this eligibility screening section were allowed to continue the survey to the next section.

- (b) Personal and organization information collection section: In this section, respondents were asked for their personal and organization background. The main purpose of this section was to gather data for the two predictor variables in the study, namely organization type and organization size. When introduced to this section of the survey, the respondents were assured the anonymity and the confidentiality of the data provided. Due to study design, respondents were forced to answer each of these question. In the case of an unanswered question the system would not allow the respondent to go to the next question. There were five questions listed in this section. These questions are listed in the ‘Appendix B’ section.
- (c) Hypotheses testing section: In this section, there were fifteen questions given to the respondents to gather data related to the main hypothesis. As discussed in the ‘Survey questionnaire design’ section, these questions were setup on a six-point Likert scale. The respondents were allowed to select only one answer and advised to select most appropriate answer to the questions. In addition, selecting an answer to each question was made mandatory, thus, if any respondent did not select an answer, he or she was not allowed to proceed to the next question.

These questions were successfully implemented on the Novi System, the selected survey tool.

8.3 The pilot survey

After designing and setting up the survey in the Novi System, few known HR related and non-HR related professionals known to the researcher were asked to complete a pilot survey. The purpose of the pilot survey was to identify inconsistencies within the survey design, establish content validity, and improve questions, format, and scales (Creswell, 2003, p.158). To gather the comments of the pilot survey respondents, at the end of the original survey, a feedback section was added. Twenty five respondents were approached to respond to this pilot survey. Out of this twenty five, twenty one respondents viewed the survey but only seven respondents

completed the pilot survey with their comments. Most of the completed respondents were comfortable with the survey setup thus did not have any specific feedback. Table 3 tabulates the pilot survey feedback questions and percentage of the responses.

Table 8.2 - Pilot survey feedback

Questions	Percentage of the responses	
	Yes	No
1. Did you understand the objective of the survey?	100%	0%
2. Is the survey too long?	0%	100%
3. Did you feel comfortable answering the questions?	100%	0%
4. Is the wording of the survey clear?	100%	0%
5. Were the answer choices compatible with your experience in the matter?	85.71%	14.29%
6. Did any of the items that you think too long or hard before responding?	0%	100%
7. Did any of the items produce irritation, embarrassment, or confusion?	0%	100%
8. Did any of the questions generate response bias?	0%	100%

There was only one respondent said no to question number 5. The reason for this answer was that the respondent was not actually a HR professional. Other than that, the pilot survey feedback gave confidence that the actual survey could be launched for research data collection.

Once the pilot survey was completed, the researcher planned the actual data collection in various steps. The following sections outline the actions taken to completed data collection.

8.4 Preparing the mailing list

Since the respondents were to be contacted via email, the very first step in collecting data from the samples was to creating a separate mailing lists from the sample list. As determined earlier, there were 452 potential respondents who to provide data for this study. For the ease of use and tracking, these 452 samples were then grouped into nine Microsoft Excel data files. Respondents' first and last names, their job titles and email addresses were the only information included in these data files.

Then the actual email message to the respondents was composed in MS-Word as follows:

My name is Sathy S. Sritharakumar and I live in Ajax, Ontario. I am a PhD candidate at the University of Salford in the United Kingdom. By profession, I am an IT Service Management consultant who has specialized in process improvement, optimization and management. To partially fulfill the requirements of my doctorate I am conducting a survey to collect data from HR professionals in Canada. For this survey, you will be asked to complete a questionnaire pertaining to the impact of the implementation of an HRIS (Human Resources Information System) within your organization. It will take approximately 5 to 8 minutes to complete.

The results of this survey will be shared upon request. These results may help you to evaluate the HRIS within your organization and to make strategic decisions relevant to this subject.

The survey is designed to maintain your anonymity and your participation in this survey is completely voluntary. Your survey responses will be kept confidential and data from this research will be reported only collectively. There are no foreseeable risks associated with this empirical data collection.

If you have questions at any time about the survey or the procedures, you may contact me (Sathy. S. Sritharakumar) by emailing me at: S.Sritharakumar@edu.salford.ac.uk.

Thank you very much for your time and support. If you agree to take part in this survey, please click on the link below to start the survey:

<https://novisurvey.net/n/HRISSurvey.aspx>

Regards,

Sathy S. Sritharakumar MBA, BA

The next section describes the mail merge process that sent out the above customized emails to the respondents.

8.5 Mail merge procedure in Microsoft Word 2013

Mail merge is a software assisted process that produces multiple (and potentially large numbers of) personalized documents from a single template form and a structured data source. A letter composed in Microsoft Word (*i.e.* MS-Word) may be sent out via email to many "recipients" with personalization, such as a change of address or a change in the greeting line.

The following steps explain how the mail merge process was handled in this research to request the respondents to answer the survey (the details were obtained from Microsoft Office support site – www.support.office.com):

1. Set up the main document:

As explained the previous section, the main document was composed in Microsoft Word with the researcher's mini bio data, study details and the survey link that were the same for each version of the merged document.

2. Connect the document to a data source:

A data source is a file that contains the information to be merged into a document; for example, the names and addresses of the recipients of a letter. As explained earlier, there were nine Microsoft Excel batch files created with every respondent's first name, last name, job title and email address. Each file contained 50 or 51 respondents with their details. Then each of these data files was connected to respective mail merge attempt. In Microsoft Word, on the 'Mailings' tab, under 'Start Mail Merge' section 'Letters' selected and then under 'Select Recipients' section 'Use Existing List' was selected and connected the respective Excel data files. For example, Excel data file 1 was connected to Mail Merge 1, Excel data file 2 was connected to Mail Merge 2, and so on.

3. Refine the list of recipients or items:

Microsoft Word generated a copy of the main document for each recipient or item in the Excel data file.

4. Add placeholders, called mail merge fields, to the document:

When you perform the mail merge, the mail merge fields are filled with information from your data file. To make sure that Microsoft Word can find a column in the data file that corresponds to every address or greeting element, the mail merge fields in Microsoft Word were mapped to the columns in your data file.

5. Preview and complete the merge:

After the fields were added to the main document, the documents were ready to preview. After a complete inspection on the merge results, using the 'Send Email Messages' command on the Mailings tab, the first round broadcast mail was sent out to every respondents in each of the data file.

8.6 Email reminders

After waiting 2 weeks, the researcher noticed that only 45% of the respondents had attempted the survey, and thus he decided to send out a reminder. The reminder message sent out was drafted as given below:

This is a friendly reminder. Two weeks ago I sent you an email request to complete a survey that collects empirical data to fulfill the requirements of my PhD degree. Since this survey is set to maintain your anonymity, I am not in a position to know whether you have completed the survey or not. Therefore, if you have completed the survey already, I really would like to take this opportunity to thank you for completing the survey. In the meantime, if have had no chance to complete the survey yet, may I humbly request you to spend about 5 to 8 minutes of your time to help me by completing the survey?

To complete the survey please click the link below:

<https://novisurvey.net/n/HRISSurvey.aspx>

After the first reminder, the response rate increased to 60%. After the fourth week of the initial survey launch, the response rate was still at 60% thus the researcher decided to send out another round of reminders. Eventually the response rate settled at 72.2% with 140 respondents completing the survey and 194 of the sample size attempting the survey.

8.7 Preliminary data analysis

Upon the completion of data collection using the survey, a comprehensive preliminary data analysis was conducted to ensure the appropriateness of the data entry in the IBM SPSS. There were five steps in conducting the preliminary data analysis. These steps are briefly explained below:

8.7.1 STEP 1: Determining variables and testing levels of measurement

This research collected data from a survey questionnaire and deals with the following variables:

1. Nominal (or categorical) variables:

Nominal variables (also called categorical variables) are the ones that have two or more categories, however, there is no ordering to the categories (Morgan *et al.*, 2013). In this study there are two nominal variables, namely, ‘organization type’ and ‘organization size’ considered for hypotheses testing. These two nominal variables have the following categories:

- Organization type: Private, Government, Semi-Government and Non-Government (NGO)
- Organization size: Less than 500, Between 500 and 5000 and More than 5000

2. Ordinal variables:

Ordinal variables are also nominal variables with more than two categories, but the categories in ordinal variables are ordered from low to high, such ranks could be 1st, 2nd, 3rd, 4th, and so on, or Likert scale with multiple levels (Morgan *et al.*, 2013). In this study, there are total of 15 questions, each was measured on a 5 point Likert scale as ‘Strongly disagree’, ‘Disagree’, ‘Neutral’, ‘Agree’ and ‘Strongly agree’.

8.7.2 STEP 2: Data coding

Since all data needs to be entered as numbers in IBM SPSS, the process of assigning numeric values to the values or levels of each variable in the data set is known as ‘data coding’ (Morgan *et al.*, 2013, p. 17). As Morgan *et al.* (2013) suggested, the following seven rules were adopted to ensure that the data coding process in this research is in compliance with widely accepted quantitative data analysis approach.

Rule 1: All data should be numeric in IBM SPSS

Rule 2: Each variable for each participant must occupy the same column in the Data Editor

Rule 3: All values (codes) for a variable must be mutually exclusive

Rule 4: Each variable should be coded to obtain maximum information

Rule 5: For each participant, there must be a code or value for each variable

Rule 6: Apply any coding rules consistently for all participants

Rule 7: Use high numbers (values or codes) for the “agree” end of a variable that is ordered

After determining the variable types as stated in STEP 1, the variables were coded as follow:

a) Nominal variable – Organization type:

- 1.00 – Private
- 2.00 – Government
- 3.00 – Semi-Government
- 4.00 – Non-Government (NGO)

b) Nominal variable – Organization Size:

- 1.00 – Less than 500
- 2.00 – Between 500 and 5000
- 3.00 – More than 5000

a) Ordinal variables – 15 Question on 5 point Likert scale

- 0.00 – Strongly Disagree
- 1.00 – Disagree
- 2.00 – Neutral
- 3.00 – Agree
- 4.00 – Strongly Agree

8.7.3 STEP 3: Entering and checking data in IBM SPSS

Upon completion of the data coding the data in the MS-Excel spreadsheet was imported into IBM SPSS. The data was then defined and labelled for appropriate variable categories. Once these steps were done, the ‘*codebook*’ was printed with variables information (see ‘Appendix C’). Compared the minimum and maximum scores in the *Descriptive statistic tables* with *Codebook* to ensure that there is no data entry error have been made (Morgan *et al.*, 2013, p.35).

The following two *Descriptive tables* (the first one for nominal variables and the second one is for ordinal variables) show that there is no errors in this data set.

Table 8.3 - Descriptive statistic table for nominal variables (Independent variables)

	N	Range	Minimum	Maximum	Mean	Std. Deviation	Variance	Skewness	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error
Org. Type	140	3.00	1.00	4.00	1.9571	1.10507	1.221	.735	.205
Org. Size	140	2.00	1.00	3.00	1.8500	.74838	.560	.253	.205
Valid N (listwise)	140								

Table 8.4 - Descriptive statistic table for ordinal variables (Dependent variables)

	N	Range	Minimum	Maximum	Mean	Std. Deviation	Variance	Skewness	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error
Q1	140	4.00	.00	4.00	3.2714	.77592	.602	-1.265	.205
Q2	140	4.00	.00	4.00	2.6786	.89175	.795	-.306	.205
Q3	140	4.00	.00	4.00	2.4286	.86617	.750	-.147	.205
Q4	140	4.00	.00	4.00	2.2000	.84138	.708	.047	.205
Q5	140	4.00	.00	4.00	2.1643	.84488	.714	.042	.205
Q6	140	4.00	.00	4.00	2.1500	.94393	.891	.163	.205
Q7	140	4.00	.00	4.00	2.0071	.91743	.842	-.184	.205
Q8	140	4.00	.00	4.00	2.1357	.74148	.550	.099	.205
Q9	140	4.00	.00	4.00	2.0786	.75929	.577	-.033	.205
Q10	140	4.00	.00	4.00	2.1143	.70032	.490	-.034	.205
Q11	140	4.00	.00	4.00	2.0643	.70160	.492	-.089	.205
Q12	140	3.00	1.00	4.00	2.1714	.63408	.402	.703	.205
Q13	140	4.00	.00	4.00	2.1000	.67109	.450	.171	.205
Q14	140	4.00	.00	4.00	2.0786	.68978	.476	.163	.205
Q15	140	4.00	.00	4.00	2.0857	.70441	.496	.004	.205
Valid N (listwise)	140								

8.7.4 STEP 4: Testing Frequency Distribution: Frequency tables, Frequency polygons & Descriptive statistics

In order to determine how many participants are in each category and whether the variables involved in this data analysis has ordered or unordered levels (or values) a frequency distribution test was conducted. The frequency tables, bar charts, frequency polygons and descriptive statistic tables for each of the ordinal variable questions given below confirmed that that the dependent variables are not normally distributed.

Furthermore, determining the '*skewness*' of the dependent variable is the key of deciding whether the data analysis should be a parametric or nonparametric (Morgan *et al.*, 2013, P.51). In this study, the dependent variables are ordinal variables measured by fifteen 5-point Likert scale questions. The table above in STEP 3 above shows that all of the dependent variables are

either positively or negatively skewed, thus a nonparametric analysis such as ordinal logistic regression or Kendall's tau-b is the appropriate one for this study.

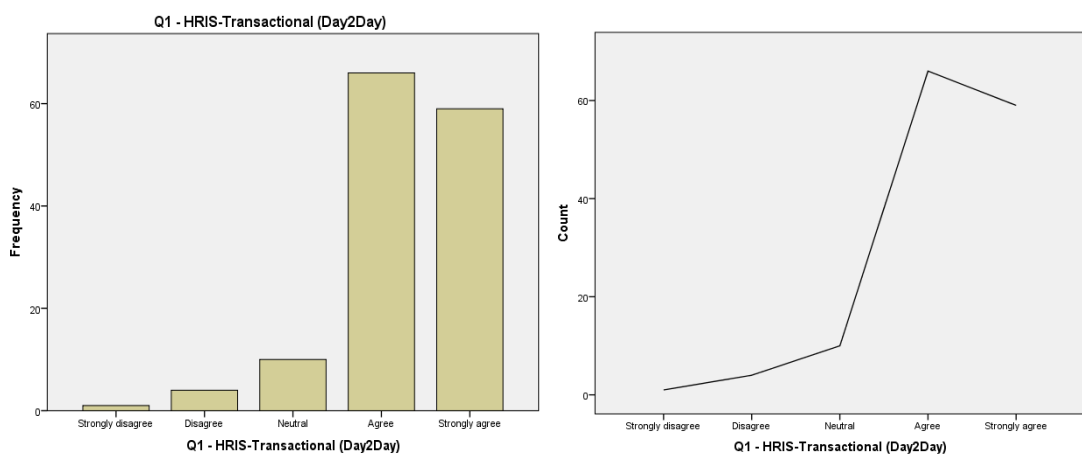
Frequency tables, bar charts, frequency polygons and descriptive statistics for each of the ordinal variable

1. Variable name: **Q1** - The implementation of the HRIS has improved overall day-to-day record keeping activities such as entering payroll information, employee status changes, *etc.* (*i.e.* HR transactional practices)

a. Frequency table

Q1 - HRIS-Transactional (Day2Day)				
	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Strongly disagree	1	.7	.7	.7
Disagree	4	2.9	2.9	3.6
Neutral	10	7.1	7.1	10.7
Agree	66	47.1	47.1	57.9
Strongly agree	59	42.1	42.1	100.0
Total	140	100.0	100.0	

b. Bar chart & Frequency polygon



c. Descriptive Statistics

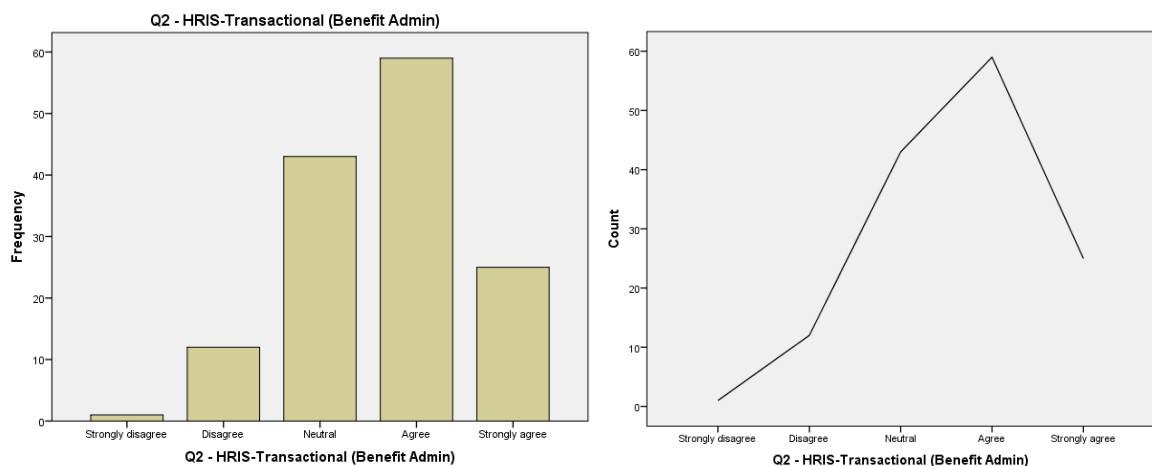
Descriptive Statistics								
	N	Range	Minimum	Maximum	Mean	Std. Deviation	Skewness	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error
Q1 - HRIS-Transactional (Day2Day)	140	4.00	.00	4.00	3.2714	.77592	-1.265	.205
Valid N (listwise)	140							

2. Variable name: **Q2** - The implementation of the HRIS has improved overall benefits administration activities such as overseeing the health insurance coverage, administering investment and retirement program, *etc.* (*i.e.* HR transactional practices)

a. Frequency table

Q2 - HRIS-Transactional (Benefit Admin)				
	Frequency	Percent	Valid Percent	Cumulative Percent
Strongly disagree	1	.7	.7	.7
Disagree	12	8.6	8.6	9.3
Neutral	43	30.7	30.7	40.0
Agree	59	42.1	42.1	82.1
Strongly agree	25	17.9	17.9	100.0
Total	140	100.0	100.0	

b. Bar chart & Frequency polygon



c. Descriptive Statistics

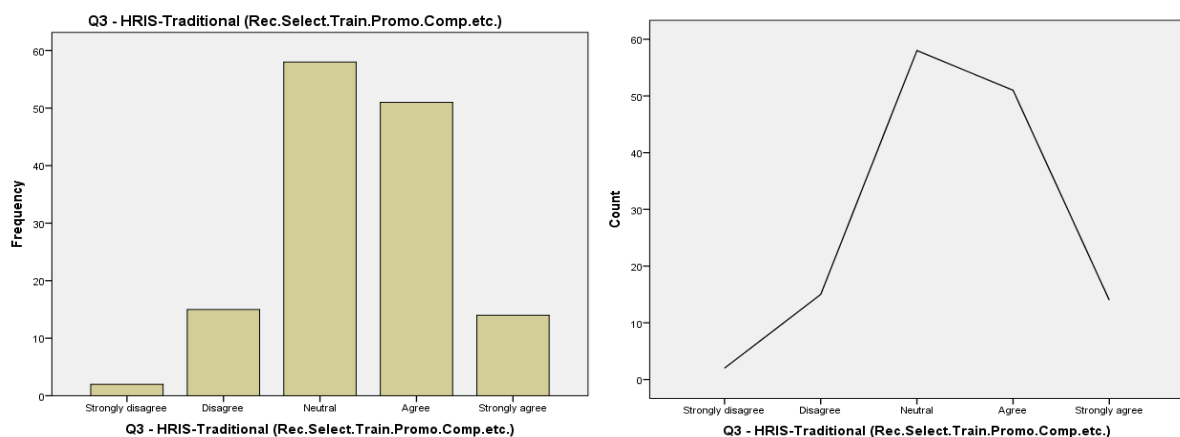
Descriptive Statistics								
	N	Range	Minimum	Maximum	Mean	Std. Deviation	Skewness	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error
Q2 - HRIS-Transactional (Benefit Admin)	140	4.00	.00	4.00	2.6786	.89175	-.306	.205
Valid N (listwise)	140							

3. Variable name: **Q3** - The implementation of the HRIS has improved overall management activities related to employee recruitment, selection, training, promotion, and compensation (*i.e.* HR traditional practices)

a. Frequency table

Q3 - HRIS-Traditional (Rec.Select.Train.Promo.Comp.etc.)				
	Frequency	Percent	Valid Percent	Cumulative Percent
Strongly disagree	2	1.4	1.4	1.4
Disagree	15	10.7	10.7	12.1
Neutral	58	41.4	41.4	53.6
Agree	51	36.4	36.4	90.0
Strongly agree	14	10.0	10.0	100.0
Total	140	100.0	100.0	

b. Bar chart & Frequency polygon



c. Descriptive Statistics

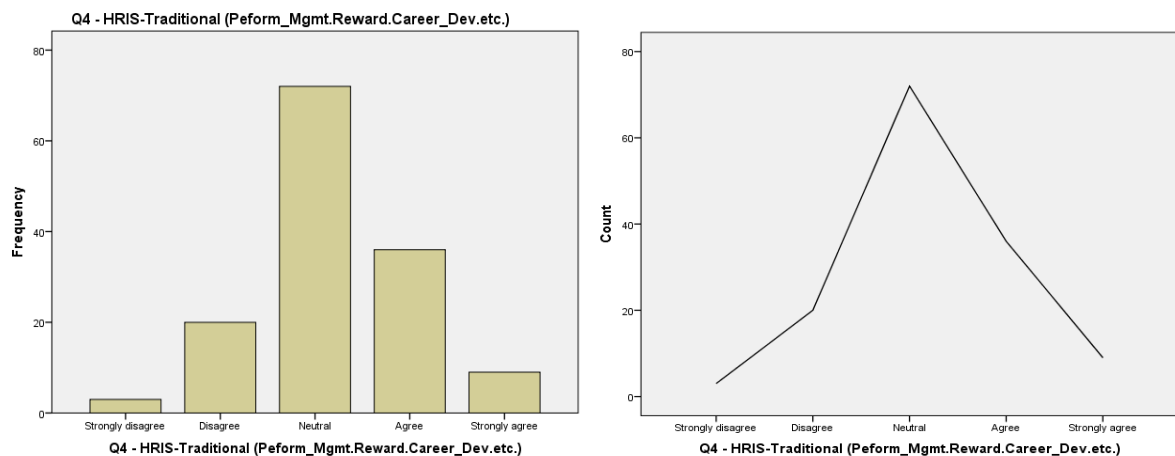
Descriptive Statistics								
	N	Range	Minimum	Maximum	Mean	Std. Deviation	Skewness	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error
Q3 - HRIS-Traditional (Rec.Select.Train.Promo.Comp.etc.)	140	4.00	.00	4.00	2.4286	.86617	-.147	.205
Valid N (listwise)	140							

4. Variable name: **Q4** - The implementation of the HRIS has improved overall HR management activities related to employee performance management, rewards, career development and communication (employee relations) (*i.e.* HR traditional practices)

a. Frequency table

Q4 - HRIS-Traditional (Peform_Mgmt.Reward.Career_Dev.etc.)				
	Frequency	Percent	Valid Percent	Cumulative Percent
Strongly disagree	3	2.1	2.1	2.1
Disagree	20	14.3	14.3	16.4
Neutral	72	51.4	51.4	67.9
Agree	36	25.7	25.7	93.6
Strongly agree	9	6.4	6.4	100.0
Total	140	100.0	100.0	

b. Bar chart & Frequency polygon



c. Descriptive Statistics

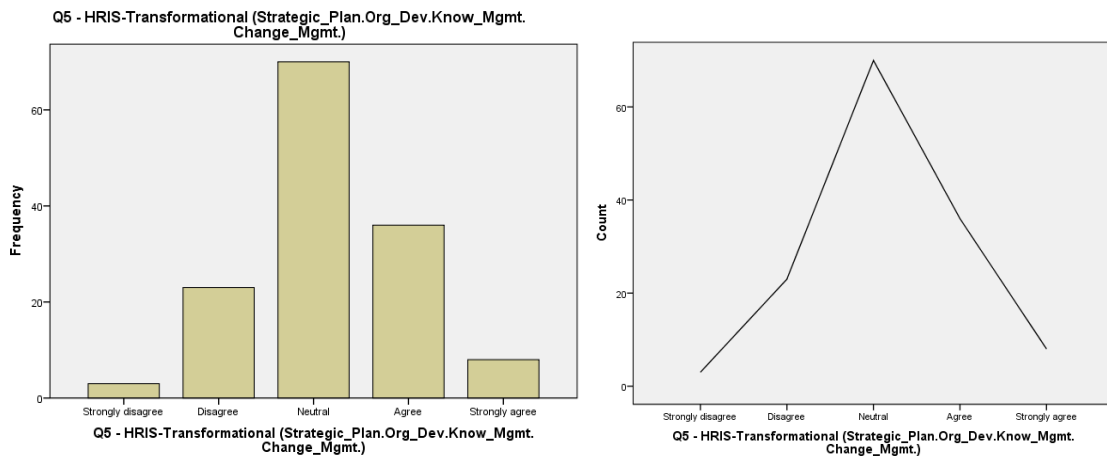
Descriptive Statistics								
	N	Range	Minimum	Maximum	Mean	Std. Deviation	Skewness	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error
Q4 - HRIS-Traditional (Peform_Mgmt.Reward.Career_Dev.etc.)	140	4.00	.00	4.00	2.2000	.84138	.047	.205
Valid N (listwise)	140							

5. Variable name: **Q5** - The implementation of the HRIS has improved overall HR management activities that meet strategic organizational objectives such as strategic planning, organizational development, knowledge management and change management (*i.e.* HR transformational practices)

a. Frequency table

Q5 - HRIS-Transformational (Strategic_Plan.Org_Dev.Know_Mgmt.Change_Mgmt.)				
	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Strongly disagree	3	2.1	2.1	2.1
Disagree	23	16.4	16.4	18.6
Neutral	70	50.0	50.0	68.6
Agree	36	25.7	25.7	94.3
Strongly agree	8	5.7	5.7	100.0
Total	140	100.0	100.0	

b. Bar chart & Frequency polygon



c. Descriptive Statistics

Descriptive Statistics

	N	Range	Minimum	Maximum	Mean	Std. Deviation	Skewness	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error
Q5 - HRIS-Transformational (Strategic_Plan.Org_Dev.Know_Mgmt.Change_Mgmt.)	140	4.00	.00	4.00	2.1643	.84488	.042	.205
Valid N (listwise)	140							

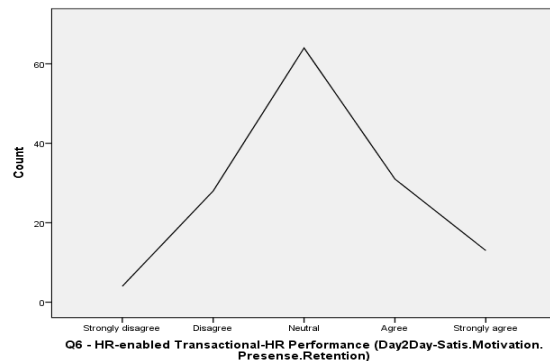
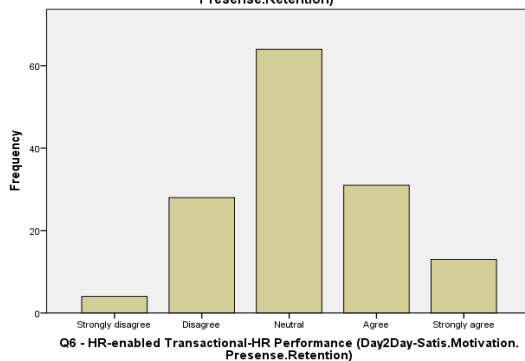
6. Variable name: **Q6** - The HR day-to-day record keeping activities, such as entering payroll information, employee status changes, *etc.* (*i.e.* HR transactional practices), that are supported by the HRIS, have contributed to the improvement of overall employee satisfaction, motivation, presence (obverse of absenteeism) and retention (obverse of turnover) (*i.e.* HR performance)

a. Frequency table

Q6 - HR-enabled Transactional-HR Performance (Day2Day-Satis.Motivation.Presense.Retention)				
	Frequency	Percent	Valid Percent	Cumulative Percent
Strongly disagree	4	2.9	2.9	2.9
Disagree	28	20.0	20.0	22.9
Neutral	64	45.7	45.7	68.6
Agree	31	22.1	22.1	90.7
Strongly agree	13	9.3	9.3	100.0
Total	140	100.0	100.0	

b. Bar chart & Frequency polygon

Q6 - HR-enabled Transactional-HR Performance (Day2Day-Satis.Motivation.Presense.Retention)



c. Descriptive Statistics

Descriptive Statistics								
	N	Range	Minimum	Maximum	Mean	Std. Deviation	Skewness	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error
Q6 - HR-enabled Transactional-HR Performance (Day2Day-Satis.Motivation.Presense.Retention)	140	4.00	.00	4.00	2.1500	.94393	.163	.205
Valid N (listwise)	140							

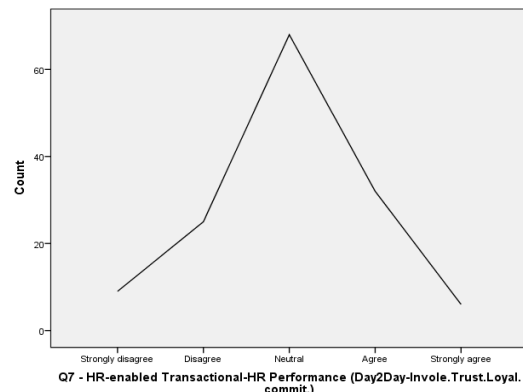
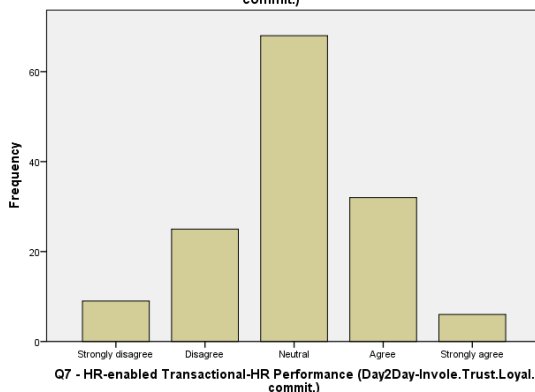
7. Variable name: **Q7** - The HR day-to-day record keeping activities, such as entering payroll information, employee status changes, *etc.* (*i.e.* HR transactional practices), that are supported by the HRIS, have contributed to the improvement of overall employee involvement, trust, loyalty, commitment and “social climate” between workers and management (*i.e.* HR performance)

a. Frequency table

Q7 - HR-enabled Transactional-HR Performance (Day2Day-Invole.Trust.Loyal.commit.)				
	Frequency	Percent	Valid Percent	Cumulative Percent
Strongly disagree	9	6.4	6.4	6.4
Disagree	25	17.9	17.9	24.3
Neutral	68	48.6	48.6	72.9
Agree	32	22.9	22.9	95.7
Strongly agree	6	4.3	4.3	100.0
Total	140	100.0	100.0	

b. Bar chart & Frequency polygon

Q7 - HR-enabled Transactional-HR Performance (Day2Day-Invole.Trust.Loyal.commit.)



c. Descriptive Statistics

Descriptive Statistics								
	N	Range	Minimum	Maximum	Mean	Std. Deviation	Skewness	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error
Q7 - HR-enabled Transactional-HR Performance (Day2Day-Invole.Trust.Loyal.commit.)	140	4.00	.00	4.00	2.0071	.91743	-.184	.205
Valid N (listwise)	140							

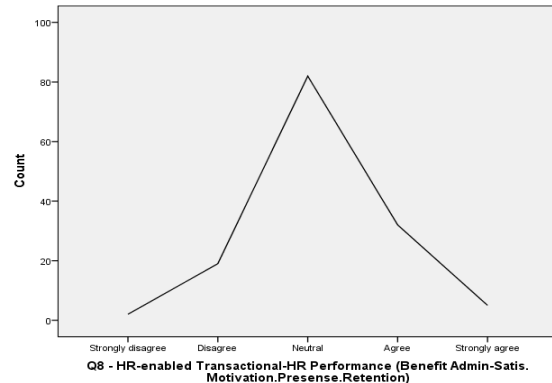
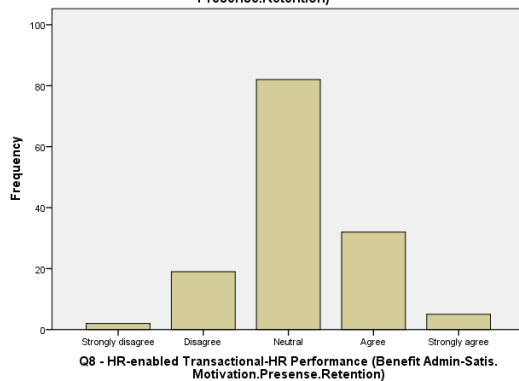
8. **Variable name: Q8** - The HR benefits administration activities, such as administering health insurance coverage, investments, retirement programs, *etc.* (*i.e.* HR transactional practices), that are supported by the HRIS, have contributed to the improvement of overall employee satisfaction, motivation, presence (obverse of absenteeism) and retention (obverse of turnover) (*i.e.* HR performance)

a. Frequency table

Q8 - HR-enabled Transactional-HR Performance (Benefit Admin-Satis.Motivation.Presense.Retention)				
	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Strongly disagree	2	1.4	1.4	1.4
Disagree	19	13.6	13.6	15.0
Neutral	82	58.6	58.6	73.6
Agree	32	22.9	22.9	96.4
Strongly agree	5	3.6	3.6	100.0
Total	140	100.0	100.0	

b. Bar chart & Frequency polygon

Q8 - HR-enabled Transactional-HR Performance (Benefit Admin-Satis.Motivation.Presense.Retention)



c. Descriptive Statistics

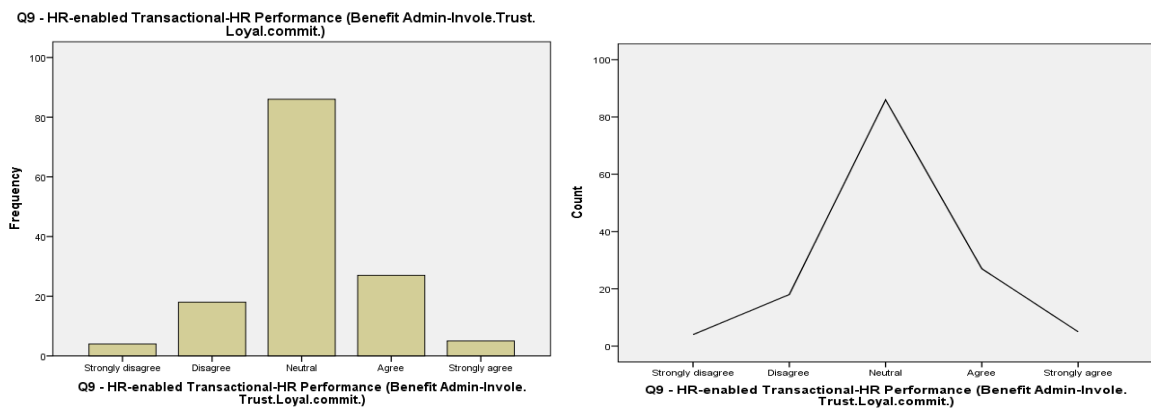
Descriptive Statistics								
	N	Range	Minimum	Maximum	Mean	Std. Deviation	Skewness	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error
Q8 - HR-enabled Transactional-HR Performance (Benefit Admin-Satis.Motivation.Presense.Retention)	140	4.00	.00	4.00	2.1357	.74148	.099	.205
Valid N (listwise)	140							

9. Variable name: **Q9** - The HR benefits administration activities, such as administering health insurance coverage, investments, retirement programs, *etc.* (*i.e.* HR transactional practices), that are supported by the HRIS, have contributed to the improvement of overall employee involvement, trust, loyalty, commitment and “social climate” between workers and management (*i.e.* HR performance)

a. Frequency table

Q9 - HR-enabled Transactional-HR Performance (Benefit Admin-Invole.Trust.Loyal.commit.)				
	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Strongly disagree	4	2.9	2.9	2.9
Disagree	18	12.9	12.9	15.7
Neutral	86	61.4	61.4	77.1
Agree	27	19.3	19.3	96.4
Strongly agree	5	3.6	3.6	100.0
Total	140	100.0	100.0	

b. Bar chart & Frequency polygon



c. Descriptive Statistics

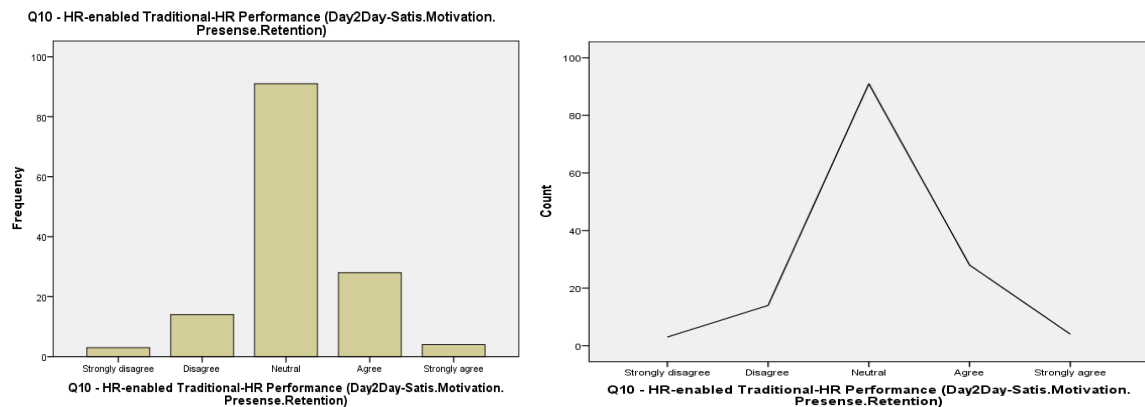
Descriptive Statistics								
	N	Range	Minimum	Maximum	Mean	Std. Deviation	Skewness	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error
Q9 - HR-enabled Transactional-HR Performance (Benefit Admin-Invole.Trust.Loyal.commit.)	140	4.00	.00	4.00	2.0786	.75929	-.033	.205
Valid N (listwise)	140							

10. Variable name: Q10 - The HR management activities of employee recruitment, selection, training, promotion, and compensation (*i.e.* HR traditional practices), that are supported by the HRIS, have contributed to the improvement of overall employee satisfaction, motivation, presence (obverse of absenteeism) and retention (obverse of turnover) (*i.e.* HR performance)

a. Frequency table

Q10 - HR-enabled Traditional-HR Performance (Day2Day-Satis.Motivation.Presense.Retention)				
	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Strongly disagree	3	2.1	2.1	2.1
Disagree	14	10.0	10.0	12.1
Neutral	91	65.0	65.0	77.1
Agree	28	20.0	20.0	97.1
Strongly agree	4	2.9	2.9	100.0
Total	140	100.0	100.0	

b. Bar chart & Frequency polygon



c. Descriptive Statistics

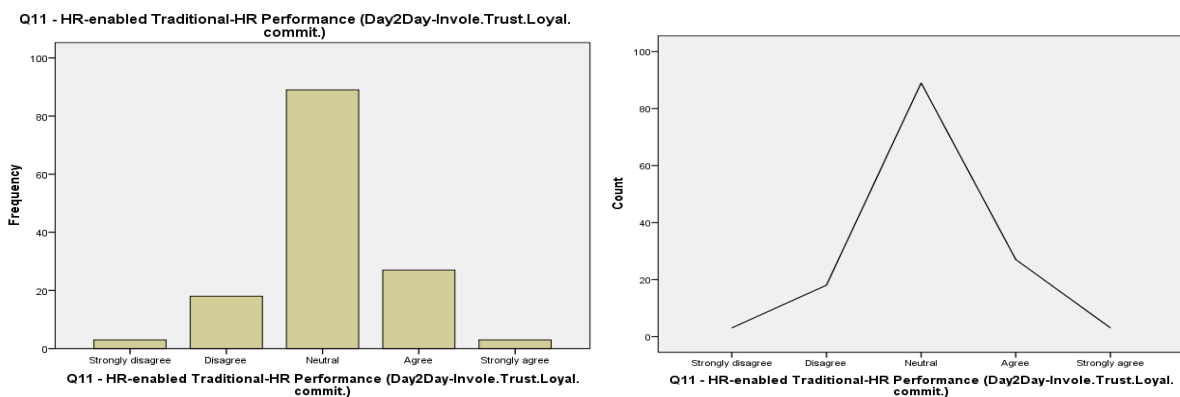
Descriptive Statistics								
	N	Range	Minimum	Maximum	Mean	Std. Deviation	Skewness	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error
Q10 - HR-enabled Traditional-HR Performance (Day2Day-Satis.Motivation.Presense.Retention)	140	4.00	.00	4.00	2.1143	.70032	-.034	.205
Valid N (listwise)	140							

11. Variable name: Q11 - The HR management activities of employee recruitment, selection, training, promotion, and compensation (*i.e.* HR traditional practices) that are supported by the HRIS have contributed to the improvement of overall employee involvement, trust, loyalty, commitment and “social climate” between workers and management (*i.e.* HR performance)

a. Frequency table

Q11 - HR-enabled Traditional-HR Performance (Day2Day-Invole.Trust.Loyal.commit.)				
	Frequency	Percent	Valid Percent	Cumulative Percent
Strongly disagree	3	2.1	2.1	2.1
Disagree	18	12.9	12.9	15.0
Neutral	89	63.6	63.6	78.6
Agree	27	19.3	19.3	97.9
Strongly agree	3	2.1	2.1	100.0
Total	140	100.0	100.0	

b. Bar chart & Frequency polygon



c. Descriptive Statistics

Descriptive Statistics								
	N	Range	Minimum	Maximum	Mean	Std. Deviation	Skewness	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error
Q11 - HR-enabled Traditional-HR Performance (Day2Day-Invole.Trust.Loyal.c ommit.)	140	4.00	.00	4.00	2.0643	.70160	-.089	.205
Valid N (listwise)	140							

12. Variable name: Q12 - The HR management activities of employee performance management, rewards, career development and communication (employee relations) (*i.e.* HR traditional practices) that are supported by the HRIS, have contributed to the improvement of overall employee satisfaction, motivation, presence (obverse of absenteeism) and retention (obverse of turnover) (*i.e.* HR performance)

a. Frequency table

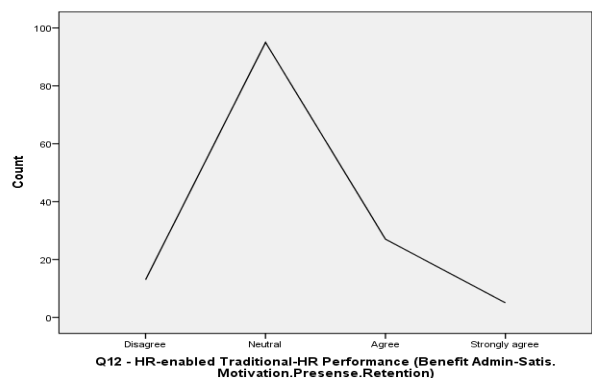
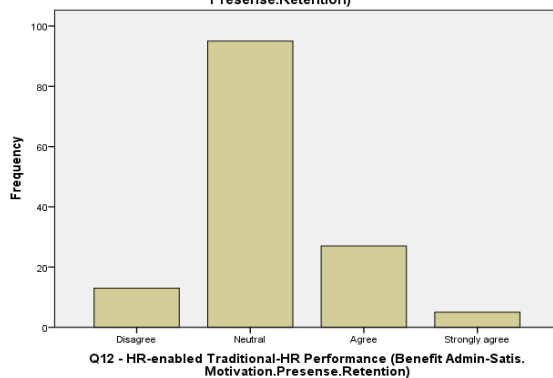
Q12 - HR-enabled Traditional-HR Performance

(Benefit Admin-Satis.Motivation.Presense.Retention)

	Frequency	Percent	Valid Percent	Cumulative Percent
Disagree	13	9.3	9.3	9.3
Neutral	95	67.9	67.9	77.1
Valid Agree	27	19.3	19.3	96.4
Strongly agree	5	3.6	3.6	100.0
Total	140	100.0	100.0	

b. Bar chart & Frequency polygon

Q12 - HR-enabled Traditional-HR Performance (Benefit Admin-Satis.Motivation.Presense.Retention)



c. Descriptive Statistics

Descriptive Statistics

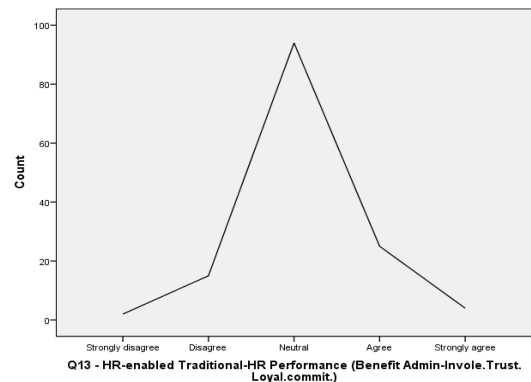
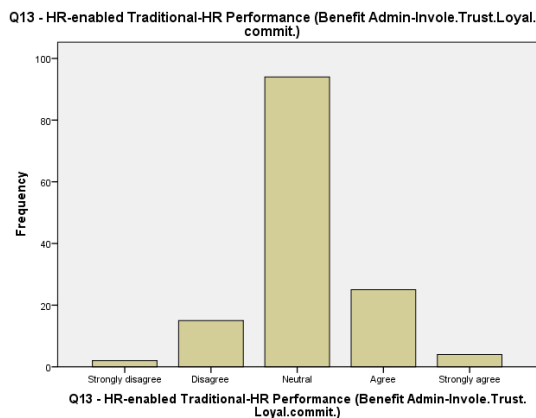
	N	Range	Minimum	Maximum	Mean	Std. Deviation	Skewness	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error
Q12 - HR-enabled Traditional-HR Performance (Benefit Admin-Satis.Motivation.Presense.Retention)	140	3.00	1.00	4.00	2.1714	.63408	.703	.205
Valid N (listwise)	140							

13. Variable name: Q13 - The HR management activities of employee performance management, rewards, career development and communication (employee relations) (*i.e.* HR traditional practices) that are supported by the HRIS, have contributed to the improvement of overall employee involvement, trust, loyalty, commitment and “social climate” between workers and management (*i.e.* HR performance)

a. Frequency table

Q13 - HR-enabled Traditional-HR Performance (Benefit Admin-Invole.Trust.Loyal.commit.)				
	Frequency	Percent	Valid Percent	Cumulative Percent
Strongly disagree	2	1.4	1.4	1.4
Disagree	15	10.7	10.7	12.1
Neutral	94	67.1	67.1	79.3
Agree	25	17.9	17.9	97.1
Strongly agree	4	2.9	2.9	100.0
Total	140	100.0	100.0	

b. Bar chart & Frequency polygon



c. Descriptive Statistics

Descriptive Statistics								
	N	Range	Minimum	Maximum	Mean	Std. Deviation	Skewness	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error
Q13 - HR-enabled Traditional-HR Performance (Benefit Admin-Invole.Trust.Loyal.commit.)	140	4.00	.00	4.00	2.1000	.67109	.171	.205
Valid N (listwise)	140							

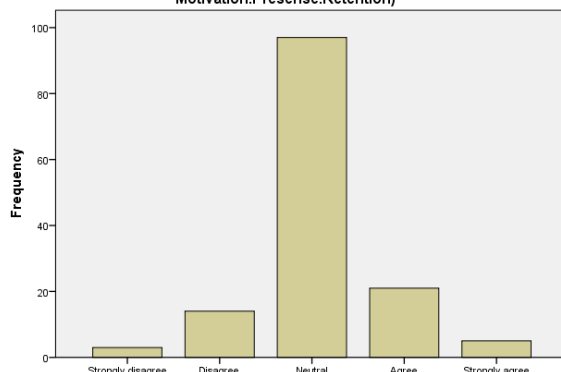
14. Variable name: Q14 - The HR activities that meet strategic organizational objectives, such as strategic planning, organizational development, knowledge management, change management, *etc.* (*i.e.* HR transformational practices), that are supported by the HRIS, have contributed to the improvement of overall employee satisfaction, motivation, presence (obverse of absenteeism) and retention (obverse of turnover) (*i.e.* HR performance)

a. Frequency table

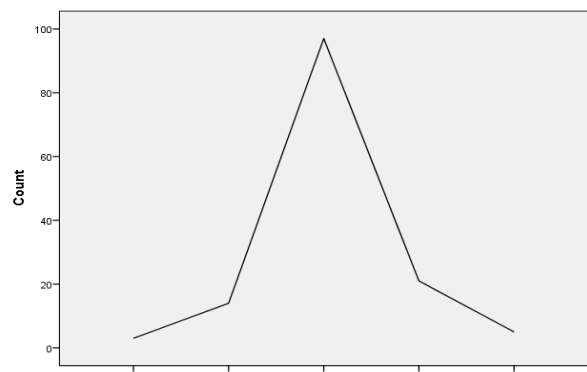
Q14 - HR-enabled Transformational-HR Performance (Transformational-Satis.Motivation.Presense.Retention)				
	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Strongly disagree	3	2.1	2.1	2.1
Disagree	14	10.0	10.0	12.1
Neutral	97	69.3	69.3	81.4
Agree	21	15.0	15.0	96.4
Strongly agree	5	3.6	3.6	100.0
Total	140	100.0	100.0	

b. Bar chart & Frequency polygon

Q14 - HR-enabled Transformational-HR Performance (Transformational-Satis. Motivation.Presense.Retention)



Q14 - HR-enabled Transformational-HR Performance (Transformational-Satis.Motivation.Presense.Retention)



Q14 - HR-enabled Transformational-HR Performance (Transformational-Satis.Motivation.Presense.Retention)

c. Descriptive Statistics

Descriptive Statistics								
	N	Range	Minimum	Maximum	Mean	Std. Deviation	Skewness	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error
Q14 - HR-enabled Transformational-HR Performance (Transformational-Satis.Motivation.Presense.Retention)	140	4.00	.00	4.00	2.0786	.68978	.163	.205
Valid N (listwise)	140							

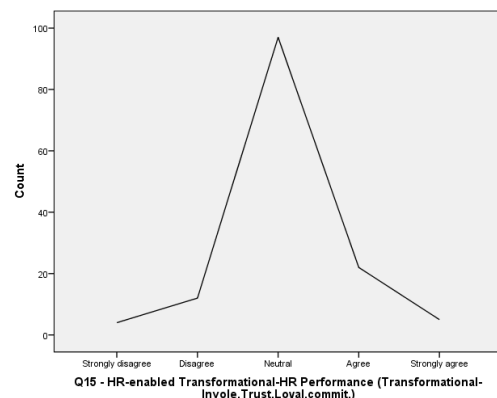
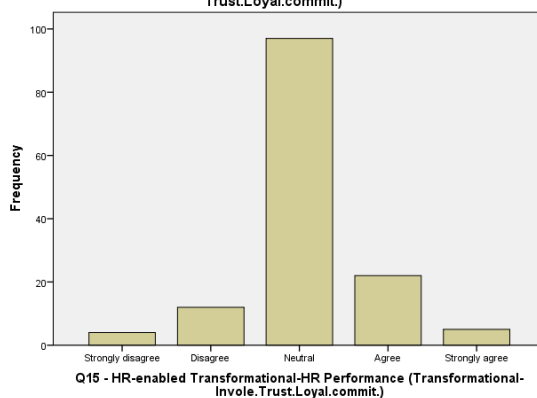
15. Variable name: Q15 - The HR activities that meet strategic organizational objectives, such as strategic planning, organizational development, knowledge management, change management, *etc.* (*i.e.* HR transformational practices), that are supported by the HRIS, have contributed to the improvement of overall employee involvement, trust, loyalty, commitment and “social climate” between workers and management (*i.e.* HR performance)

a. Frequency table

Q15 - HR-enabled Transformational-HR Performance (Transformational-Invole.Trust.Loyal.commit.)				
	Frequency	Percent	Valid Percent	Cumulative Percent
Strongly disagree	4	2.9	2.9	2.9
Disagree	12	8.6	8.6	11.4
Neutral	97	69.3	69.3	80.7
Agree	22	15.7	15.7	96.4
Strongly agree	5	3.6	3.6	100.0
Total	140	100.0	100.0	

b. Bar chart & Frequency polygon

Q15 - HR-enabled Transformational-HR Performance (Transformational-Invole.Trust.Loyal.commit.)



c. Descriptive Statistics

Descriptive Statistics								
	N	Range	Minimum	Maximum	Mean	Std. Deviation	Skewness	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error
Q15 - HR-enabled Transformational-HR Performance (Transformational-Invole.Trust.Loyal.commit.)	140	4.00	.00	4.00	2.0857	.70441	.004	.205
Valid N (listwise)	140							

8.7.5 STEP 5: Exploratory factor analysis to assess evidence for validity

Principal axis factor analysis with varimax rotation was conducted to assess the underlying structure for the 10 items of the research questionnaire that were designed to answer the research question ‘*Does the HRIS-enabled HR practices (namely transactional, traditional and transformational) significantly impact the HRM Performance?*’. Three factors were requested, based on the fact that the items were designed to index three constructs: transactional, traditional and transformational HR practices. After the rotation, the first factor accounted for 27.6% of the variance, the second factor accounted for 25.9%, and the third factor accounted for 19.4%. The table below displays the items and factor loadings for the rotated factors, with loadings less than .40 omitted to improve clarity.

The first factor, which seems to index the impact of HRIS-enabled HR traditional management practices on HRM performance, had strong loadings on the first four items. The second factor, which seems to index the impact of HRIS-enabled HR transactional management practices on HRM performance, had strong loadings on the next four items. The third factor, HR transformational management practices on HRM performance, had strong loadings on the next two items. Thus, the results provides some support for validity; namely that there are three concepts (transactional, traditional and transformational HR practices) measured by the 10 items.

Table 8.5 - Factor loadings for the Rotated Factors

Item	Factor Loadings		
	1	2	3
Q11 - HRIS-enabled HR traditional management practices such as recruitment, selection, training, promotion and compensation have contributed to the improvement of overall HRM performance measured by employee involvement, trust, loyalty, commitment and social climate between workers and management.	.851		
Q12 - HRIS-enabled HR traditional management practices such as performance management, rewards, career development and communication compensation have contributed to the improvement of overall HRM performance that is measured by overall employee satisfaction, motivation, presence (obverse of absenteeism) and retention (obverse of turnover).	.752		
Q13 - HRIS-enabled HR traditional management practices such as performance management, rewards, career development and communication have contributed to the improvement of overall HRM performance that is measured by overall employee involvement, trust, commitment and social climate between workers and management.	.724		
Q10 - HRIS-enabled HR traditional management practices such as recruitment, selection, training, promotion and compensation have contributed to the improvement of overall HRM performance that is measured by overall employee satisfaction, motivation, presence (obverse of absenteeism) and retention (obverse of turnover).	.722		
Q9 - HRIS-enabled HR transactional benefit administration practices such as overseeing the health insurance coverage, administering investment and retirement program, <i>etc.</i> have contributed to the improvement of overall HRM performance that is measured by overall employee involvement, trust, commitment and social climate between workers and management.		.833	

Q8 - HRIS-enabled HR transactional benefit administration practices such as overseeing the health insurance coverage, administering investment and retirement program, <i>etc.</i> have contributed to the improvement of overall HRM Performance that is measured by overall employee satisfaction, motivation, presence (obverse of absenteeism) and retention (obverse of turnover).		.747	
Q7 - HRIS-enabled HR transactional day-to-day record keeping practices such as entering payroll information, employee status changes, <i>etc.</i> have contributed to the improvement of overall HRM Performance that is measured by overall employee involvement, trust, commitment and social climate between workers and management.		.741	
Q6 - HRIS-enabled HR transactional day-to-day record keeping practices such as entering payroll information, employee status changes, <i>etc.</i> have contributed to the improvement of overall HRM Performance that is measured by overall employee satisfaction, motivation, presence (obverse of absenteeism) and retention (obverse of turnover).		.538	
Q14 - HRIS-enabled HR transformational management practices such as strategic planning, organizational development, knowledge management and change management have contributed to the improvement of overall HRM Performance that is measured by overall employee satisfaction, motivation, presence (obverse of absenteeism) and retention (obverse of turnover).			.856
Q15 - HRIS-enabled HR transformational management practices such as strategic planning, organizational development, knowledge management and change management have contributed to the improvement of overall HRM Performance that is measured by overall employee involvement, trust, commitment and social climate between workers and management.			.855
% of variance	27.6	25.9	19.4
<i>Note: Loadings < .40 are omitted</i>			

8.7.6 Cronbach's alpha to assess internal consistency reliability

Based on a factor analysis of the 10 items of the research questionnaire that were designed to answer the research question '*Does the HRIS-enabled HR practices (namely transactional, traditional and transformational) significantly impact the HRM Performance?*' three factors were derived. To assess whether the data from the variables in each factor form three reliable scales, Cronbach's alphas were computed.

- a) The alpha for the four item '*HRIS-enabled HR transactional practices - HRM Performance*' scale was .856, which indicates that the items would form a scale that has a high level of internal consistency reliability.

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.856	.864	4

Figure 8.1 - Reliability Statistics for HRIS-enabled HR transactional practices - HRM Performance

- b) Similarly, the alpha for the four item '*HRIS-enabled HR traditional practices - HRM Performance*' scale was .899, which also indicates that the items would form a scale that has a high level of internal consistency reliability.

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.899	.900	4

Figure 8.2 - Reliability Statistics for HRIS-enabled HR traditional practices - HRM Performance

- c) Finally, the alpha for the two item '*HRIS-enabled HR transformational practices - HRM Performance*' scale was .973, which also indicates that the items would form a scale that has a high level of internal consistency reliability.

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.973	.974	2

Figure 8.3 - Reliability Statistics for HRIS-enabled HR transformational practices - HRM Performance

8.8 Conclusion

This chapter started by explaining the logic behind this survey by revisiting the research questions and the hypotheses. Survey logic is influenced by two factors, (1) the type of survey, and (2) the variables in the research questions. As discussed in the previous chapter, in this study the survey type was identified as cross-sectional survey approach and the predictor and dependent variables were identified from the hypotheses and tabulated.

Subsequently, the activities related to setting up the closed-end questionnaire in the Novi System (the survey instrument) were discussed in details. After a setting up the survey in Novi System, a pilot survey was conducted identify pitfalls within the survey design, establish the content validity, and improve questions, format, and the scales. 25 randomly selected samples were contacted to run the pilot survey and 7 of these 25 completed the survey. Most of the completed respondents were comfortable with the survey setup, thus did not have any specific concerns about the questionnaire. This result gave the confident that the actual survey can be launched for further data collection.

Contacting respondents via email process was started by preparing the mailing list. There were 452 potential respondents in the sample list thus for the ease of management, these 452 were grouped into nine Microsoft Excel data file sets. Once this was done, the 'mail merge' process in Microsoft Word was initiated to send out broadcast emails requesting the respondents to attend the survey. There were two reminders sent out to the respondents and eventually the response rate settled at 72.2% with 140 respondents completing the survey and 194 of the sample size attempting the survey.

Finally, the preliminary data analysis section identified:

1. the types of variables in this study are nominal and ordinal
2. that there are no data or coding error in the data set
3. that frequency distribution is not normal thus nonparametric data analysis such as ordinal logistic regression or Kendall's tau-b is the appropriate, and
4. the internal validity and reliability.

Chapter 9 will explore the impact of HRIS-enabled HR practices on HRM performance using the data collected by the survey.

Chapter 9

Impact of HRIS-enabled HR practices on HRM performance

To answer the main research question, ‘*Does the HRIS-enabled HR practices (namely transactional, traditional and transformational) significantly impact the HRM Performance?*’ as described in Chapter 4, the following hypotheses were formed:

Null Hypothesis 1 (H1_o): HRIS-enabled HR transactional practices do not significantly impact the HRM Performance.

Alternative Hypothesis 1 (H1): HRIS-enabled HR transactional practices significantly impact the HRM Performance.

Null Hypothesis 2 (H2_o): HRIS-enabled HR traditional practices do not significantly impact the HRM Performance.

Alternative Hypothesis 2 (H2): HRIS-enabled HR traditional practices significantly impact the HRM Performance.

Null Hypothesis 3 (H3_o): HRIS-enabled HR transformational practices do not significantly impact the HRM Performance.

Alternative Hypothesis 3 (H3): HRIS-enabled HR transformational practices significantly impact the HRM Performance.

Figure 9.1 illustrates the hypotheses as they are linked to the main research question:

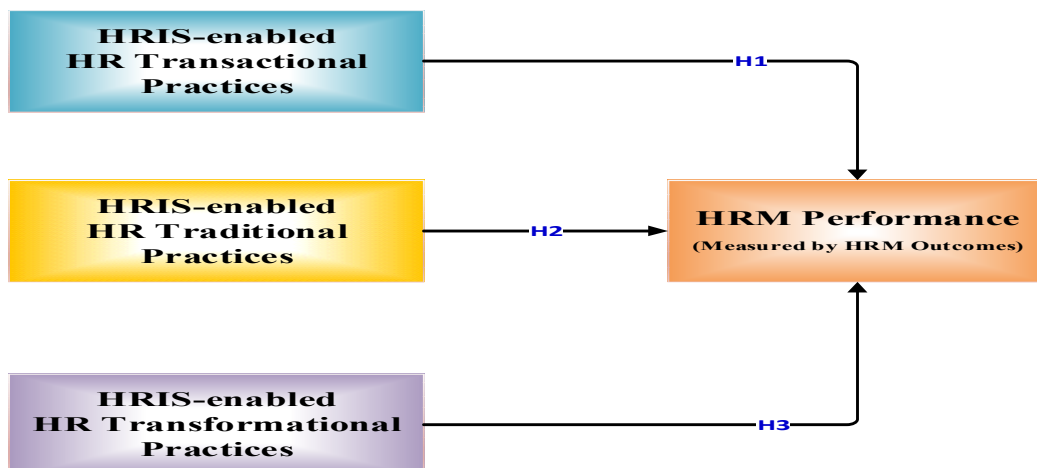


Figure 9.1 - HRIS-enabled HR practices – HRM performance model

9.1 Kendall's tau-b correlation analysis

To test the above hypotheses, a rigorous relationship measuring statistical approach is required. Correlation coefficient analyses such as Pearson's correlation, Spearman's correlation, Gamma correlation and Kendall's tau are intended to measure the strength of the relationship between two variables. Kendall's tau, unlike other correlation approaches, has an intuitively simple interpretation that employs an algebraic structure. Noether (1981) suggests that Kendall's tau is one of the best approaches to measure the strength of the relationship. Echoing the same sentiment, Terziovski and Guerrero (2014) advise the use of Kendall's tau-b as a more robust correlation coefficient under a wide variety of data distribution. Since, as described in Chapter 8, both the independent variables and the dependent variables are nonparametric ordinal variables and as this research has a wide range of data distribution that tries to measure the strength of relationships between a HRIS-enabled HR practices and the HRM performance, the Kendall tau-b correlation is used (Morgan *et al.*, 2013; Terziovski and Guerrero 2014).

Assumption: The main assumption for Kendall tau-b correlation is that the data are at least ordinal (Morgan *et al.*, 2013, p.143).

In order to conduct the Kendall tau-b correlation, based on the survey questionnaire design described in Chapter 7, Research Methods: Measures (Table 7.1), ten separate analyses are needed. For the ease of understanding, these ten analyses are categorized into three sections; the first section includes four analyses that test the strength of relationship between the HRIS-enabled HR transactional practices and the HRM performance; the second section includes next four analyses that test the strength of relationship between the HRIS-enabled HR traditional practices and the HRM performance; and the last section includes two analyses that test the strength of relationship between the HRIS-enabled HR transformational practices and the HRM performance. Table 9.1 summarizes these details:

Table 9.1 - The impact of HRIS-enabled HR practices on HRM performance

Analysis	Independent variable	Dependent variable
	Association between HRIS-enabled HR transactional practices and HRM performance	
1	HRIS-enabled HR transactional day-to-day record keeping practices such as entering payroll information, employee status changes, <i>etc.</i> (Question 1)	HRM performance that is measured by overall employee satisfaction, motivation, presence (obverse of absenteeism) and retention (obverse of turnover). (Question 6)
2	HRIS-enabled HR transactional day-to-day record keeping practices such as entering payroll information, employee status changes, <i>etc.</i> (Question 1)	HRM performance that is measured by overall employee involvement, trust, commitment and social climate between workers and management. (Question 7)

3	HRIS-enabled HR transactional benefit administration practices such as, overseeing the health insurance coverage, administering investment and retirement program, <i>etc.</i> (Question 2)	HRM performance that is measured by overall employee satisfaction, motivation, presence (obverse of absenteeism) and retention (obverse of turnover). (Question 8)
4	HRIS-enabled HR transactional benefit administration practices such as, overseeing the health insurance coverage, administering investment and retirement program, <i>etc.</i> (Question 2)	HRM performance that is measured by overall employee involvement, trust, commitment and social climate between workers and management. (Question 9)
Association between HRIS-enabled HR <i>traditional</i> practices and HRM performance		
5	HRIS-enabled HR traditional management practices such as recruitment, selection, training, promotion and compensation. (Question 3)	HRM performance that is measured by overall employee satisfaction, motivation, presence (obverse of absenteeism) and retention (obverse of turnover). (Question 10)
6	HRIS-enabled HR traditional management practices such as recruitment, selection, training, promotion and compensation. (Question 3)	HRM performance that is measured by overall employee involvement, trust, commitment and social climate between workers and management. (Question 11)
7	HRIS-enabled HR traditional management practices such as performance management, rewards, career development and communication. (Question 4)	HRM performance that is measured by overall employee satisfaction, motivation, presence (obverse of absenteeism) and retention (obverse of turnover). (Question 12)
8	HRIS-enabled HR traditional management practices such as performance management, rewards, career development and communication. (Question 4)	HRM performance that is measured by overall employee involvement, trust, commitment and social climate between workers and management. (Question 13)
Association between HRIS-enabled HR <i>transformational</i> practices and HRM performance		
9	HRIS-enabled HR transformational management practices such as strategic planning, organizational development, knowledge management and change management. (Question 5)	HRM performance that is measured by overall employee satisfaction, motivation, presence (obverse of absenteeism) and retention (obverse of turnover). (Question 14)
10	HRIS-enabled HR transformational management practices such as strategic planning, organizational development, knowledge management and change management. (Question 5)	HRM performance that is measured by overall employee involvement, trust, commitment and social climate between workers and management. (Question 15)

Correlation coefficient values (*i.e.* the strength of association between two variables) are determined between minus one and plus one scale (*i.e.* -1 to +1 scale) used by Pearson correlation. The positive correlation suggests that the variables are perfectly linear by an increasing relationship and the negative correlation suggests that as the variables are perfectly linear by a decreasing relationship (Morgan *et al.*, 2013, and Bolboaca and Jäntschi, 2006). Morgan *et al.*, (2013, p.145) suggest that:

If the association between variables is weak, the value of the statistic will be close to zero and the significance level (Sig.) will be greater than .05, the usual cut-off to say

that an association is statistically significant. However, if the association is statistically significant, the p-value will be small ($<.05$).

The effect size, in other words the strength of relationship in the analyses is interpreted, as cited by Morgan *et al.* (2013, p.102), based on Cohen (1998) and Vaske, Gliner and Morgan (2002) table given below:

Table 9.2 - Interpretation of the strength of a relationship (effect size)

General interpretation of the strength of a relationship	r^2	r
Much larger than typical	.49	$\geq .70 $
Large or larger than typical	.25	$.50 $
Medium or typical	.09	$.30 $
Small or smaller than typical	.01	$.10 $

Note: ‘ r ’ family values can vary from 0.0 to ± 1.0 , but except for reliability (*i.e.* the same concept measured twice), ‘ r ’ is rarely above .70.

9.2 The impact of HRIS-enabled HR practices on HRM performance

As stated above, in order to determine the association between the HRIS-enabled HR practices and the HRM Performance the analyses were conducted in three sections. These analyses are discussed below.

9.2.1 The impact of HRIS-enabled HR transactional practices on HRM performance

The analyses in this section are based on the following hypothesis:

Null Hypothesis 1 (H1_o): HRIS-enabled HR transactional practices do not significantly impact the HRM Performance.

Alternative Hypothesis 1 (H1₁): HRIS-enabled HR transactional practices significantly impact the HRM Performance.

The following table depicts the summary of the Kendall’s tau-b association analyses that the researcher carried out to determine if there is any impact of HRIS-enabled HR transactional practices significantly impact the HRM performance:

Table 9.3 - Results: The impact of HRIS-enabled HR transactional practices on HRM performance

Kendall's tau-b Association	'r' (Correlation Coefficient or Strength of Relationship)	Association	p-value	Significance
Q1 & Q6 (Analysis 1)	+0.206**	Smaller than Typical	0.006	Positively Significant at 0.01 level
Q1 & Q7 (Analysis 2)	+0.243**	Smaller than Typical	0.001	Positively Significant at 0.01 level
Q2 & Q8 (Analysis 3)	+0.385**	Typical	0.000	Positively Significant at 0.01 level
Q2 & Q9 (Analysis 4)	+0.344**	Typical	0.000	Positively Significant at 0.01 level

* $p < 0.05$

** $p < 0.01$

*** $p < 0.001$

Analysis 1: To investigate the relationship between HRIS-enabled day-to-day human resources transactional record keeping practices such as, entering payroll information, employee status changes, *etc.* and HRM performance that is measured by overall employee satisfaction, motivation, presence (obverse of absenteeism) and retention (obverse of turnover), a Kendall's tau-b correlation test was conducted.

Q1 - HRIS-Transactional (Day2Day) * Q6 - HR-enabled Transactional-HR Performance (Day2Day-Satis.Motivation.Presense.Retention) Crosstabulation

			Q6 - HR-enabled Transactional-HR Performance (Day2Day-Satis.Motivation.Presense.Retention)					Total
			Strongly disagree	Disagree	Neutral	Agree	Strongly agree	
Q1 - HRIS-Transactional (Day2Day)	Strongly disagree	Count	0	1	0	0	0	1
		Expected Count	.0	.2	.5	.2	.1	1.0
		% of Total	0.0%	0.7%	0.0%	0.0%	0.0%	0.7%
	Disagree	Count	0	2	1	1	0	4
		Expected Count	.1	.8	1.8	.9	.4	4.0
		% of Total	0.0%	1.4%	0.7%	0.7%	0.0%	2.9%
	Neutral	Count	1	2	6	1	0	10
		Expected Count	.3	2.0	4.6	2.2	.9	10.0
		% of Total	0.7%	1.4%	4.3%	0.7%	0.0%	7.1%
	Agree	Count	2	14	32	15	3	66
		Expected Count	1.9	13.2	30.2	14.6	6.1	66.0
		% of Total	1.4%	10.0%	22.9%	10.7%	2.1%	47.1%
	Strongly agree	Count	1	9	25	14	10	59
		Expected Count	1.7	11.8	27.0	13.1	5.5	59.0
		% of Total	0.7%	6.4%	17.9%	10.0%	7.1%	42.1%
	Total	Count	4	28	64	31	13	140
		Expected Count	4.0	28.0	64.0	31.0	13.0	140.0
		% of Total	2.9%	20.0%	45.7%	22.1%	9.3%	100.0%

Figure 9.2 - Q1 & Q6 Cross Tabulation

Symmetric Measures

	Value	Asymp. Std. Error ^a	Approx. T ^b	Approx. Sig.
Ordinal by Ordinal Kendall's tau-b	.206	.072	2.816	.005
N of Valid Cases	140			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

Figure 9.3 - Q1 & Q6 Symmetric Measures

Correlations				
			Q1 - HRIS-Transactional (Day2Day)	Q6 - HR-enabled Transactional -HR Performance (Day2Day-Satis. Motivation. Presense. Retention)
Kendall's tau_b	Q1 - HRIS-Transactional (Day2Day)	Correlation Coefficient	1.000	.206**
		Sig. (2-tailed)	.	.006
		N	140	140
	Q6 - HR-enabled Transactional-HR Performance (Day2Day-Satis. Motivation. Presense. Retention)	Correlation Coefficient	.206**	1.000
		Sig. (2-tailed)	.006	.
		N	140	140

**. Correlation is significant at the 0.01 level (2-tailed).

Figure 9.4 - Statistical analysis between HRIS-enabled HR transactional practices and HRM performance (Q1 and Q6)

The analysis indicated a statistically significant positive association between HRIS-enabled HR transactional practices and their impact on the HRM performance, $\tau (138) = .206, p < .01$ (*i.e.* $p = .006$). This means that the HRIS-enabled HR transactional day-to-day record keeping practices such as entering payroll information, employee status changes, *etc.* significantly positively impacts the HRM performance that is measured by overall employee satisfaction, motivation, presence (obverse of absenteeism) and retention (obverse of turnover) at ‘**smaller than typical**’ level. In other words, the null hypothesis is rejected, therefore, the alternative hypothesis **H1: $\tau \neq 0$** is valid.

However, it should be noted that since the value of ‘r’ (*i.e.* the correlation coefficient or strength of relationship) is closer to ‘0’ (*i.e.* $r = .206$), greater portion of the two data sets being compared are discordant, thus to a certain extent, weak in association. In other words, even though the HRIS-enabled HR transactional day-to-day record keeping practices such as entering payroll information, employee status changes, *etc.* significantly positively impacts the HRM performance that is measured by overall employee satisfaction, motivation, presence (obverse of absenteeism) and retention (obverse of turnover), the level of association should be considered ‘weak’ (Morgan *et al.*, 2013, p.145).

Analysis 2: To investigate the relationship between HRIS-enabled day-to-day HR transactional record keeping practices such as, entering payroll information, employee status changes, *etc.* and HRM performance that is measured by overall employee involvement, trust, commitment

and social climate between workers and management, a Kendall's tau-b correlation test was conducted.

Q1 - HRIS-Transactional (Day2Day) * Q7 - HR-enabled Transactional-HR Performance (Day2Day-Invole.Trust.Loyal.commit.) Crosstabulation								
			Q7 - HR-enabled Transactional-HR Performance (Day2Day-Invole.Trust.Loyal.commit.)					Total
			Strongly disagree	Disagree	Neutral	Agree	Strongly agree	
Q1 - HRIS-Transactional (Day2Day)	Strongly disagree	Count	1	0	0	0	0	1
		Expected Count	.1	.2	.5	.2	.0	1.0
		% of Total	0.7%	0.0%	0.0%	0.0%	0.0%	0.7%
	Disagree	Count	1	1	2	0	0	4
		Expected Count	.3	.7	1.9	.9	.2	4.0
		% of Total	0.7%	0.7%	1.4%	0.0%	0.0%	2.9%
	Neutral	Count	2	3	4	1	0	10
		Expected Count	.6	1.8	4.9	2.3	.4	10.0
		% of Total	1.4%	2.1%	2.9%	0.7%	0.0%	7.1%
	Agree	Count	3	12	36	15	0	66
		Expected Count	4.2	11.8	32.1	15.1	2.8	66.0
		% of Total	2.1%	8.6%	25.7%	10.7%	0.0%	47.1%
	Strongly agree	Count	2	9	26	16	6	59
		Expected Count	3.8	10.5	28.7	13.5	2.5	59.0
		% of Total	1.4%	6.4%	18.6%	11.4%	4.3%	42.1%
Total	Count	9	25	68	32	6	140	
	Expected Count	9.0	25.0	68.0	32.0	6.0	140.0	
	% of Total	6.4%	17.9%	48.6%	22.9%	4.3%	100.0%	

Figure 9.5 - Q1 & Q7 Cross Tabulation

Symmetric Measures

	Value	Asymp. Std. Error ^a	Approx. T ^b	Approx. Sig.
Ordinal by Ordinal Kendall's tau-b	.243	.074	3.172	.002
N of Valid Cases	140			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

Figure 9.6 - Q1 & Q7 Symmetric Measures

Correlations

			Q1 - HRIS-Transactional (Day2Day)	Q7 - HR-enabled Transactional-HR Performance (Day2Day-Invole.Trust.Loyal.commit.)
Kendall's tau_b	Q1 - HRIS-Transactional (Day2Day)	Correlation Coefficient	1.000	.243**
		Sig. (2-tailed)	.	.001
		N	140	140
	Q7 - HR-enabled Transactional-HR Performance (Day2Day-Invole.Trust.Loyal.commit.)	Correlation Coefficient	.243**	1.000
		Sig. (2-tailed)	.001	.
		N	140	140

** . Correlation is significant at the 0.01 level (2-tailed).

Figure 9.7 - Statistical analysis between HRIS-enabled HR transactional practices and HRM performance (Q1 and Q7)

The analysis indicated a statistically significant positive association between HRIS-enabled HR transactional practices and their impact on the HRM performance, $\tau(138) = .243$, $p < .01$ (i.e. $p = .001$). This means that the HRIS-enabled HR transactional day-to-day record keeping

practices such as entering payroll information, employee status changes, *etc.* significantly positively impact the HRM performance that is measured by overall employee involvement, trust, commitment and social climate between workers and management at ‘**smaller than typical**’ level. In other words, the null hypothesis is rejected, therefore, the alternative hypothesis **H1: $\tau \neq 0$** is valid.

However, it should be noted that since the value of ‘r’ (*i.e.* the correlation coefficient or strength of relationship) is closer to ‘0’ (*i.e.* $r = .243$), greater portion of the two data sets being compared are discordant, thus to a certain extent, weak in association. In other words, even though the HRIS-enabled HR transactional day-to-day record keeping practices such as entering payroll information, employee status changes, *etc.* significantly positively impact the HRM performance that is measured by overall employee involvement, trust, commitment and social climate between workers and management, the level of association should be considered ‘weak’(Morgan *et al.*, 2013, p.145).

Analysis 3: To investigate the relationship between HRIS-enabled HR transactional benefit administration practices such as, overseeing the health insurance coverage, administering investment and retirement program, *etc.* and HRM performance that is measured by overall employee satisfaction, motivation, presence (obverse of absenteeism) and retention (obverse of turnover), a Kendall’s tau-b correlation test was conducted.

Q2 - HRIS-Transactional (Benefit Admin) * Q8 - HR-enabled Transactional-HR Performance (Benefit Admin-Satis.Motivation.Presense.Retention) Crosstabulation

			Q8 - HR-enabled Transactional-HR Performance (Benefit Admin-Satis.Motivation.Presense.Retention)					Total
			Strongly disagree	Disagree	Neutral	Agree	Strongly agree	
Q2 - HRIS-Transactional (Benefit Admin)	Strongly disagree	Count	0	0	1	0	0	1
		Expected Count	.0	.1	.6	.2	.0	1.0
		% of Total	0.0%	0.0%	0.7%	0.0%	0.0%	0.7%
	Disagree	Count	2	5	4	1	0	12
		Expected Count	.2	1.6	7.0	2.7	.4	12.0
		% of Total	1.4%	3.6%	2.9%	0.7%	0.0%	8.6%
	Neutral	Count	0	5	37	1	0	43
		Expected Count	.6	5.8	25.2	9.8	1.5	43.0
		% of Total	0.0%	3.6%	26.4%	0.7%	0.0%	30.7%
	Agree	Count	0	7	29	23	0	59
		Expected Count	.8	8.0	34.6	13.5	2.1	59.0
		% of Total	0.0%	5.0%	20.7%	16.4%	0.0%	42.1%
	Strongly agree	Count	0	2	11	7	5	25
		Expected Count	.4	3.4	14.6	5.7	.9	25.0
		% of Total	0.0%	1.4%	7.9%	5.0%	3.6%	17.9%
	Total	Count	2	19	82	32	5	140
		Expected Count	2.0	19.0	82.0	32.0	5.0	140.0
		% of Total	1.4%	13.6%	58.6%	22.9%	3.6%	100.0%

Figure 9.8 - Q2 & Q8 Cross Tabulation

Symmetric Measures

	Value	Asymp. Std. Error ^a	Approx. T ^b	Approx. Sig.
Ordinal by Ordinal Kendall's tau-b	.385	.068	5.262	.000
N of Valid Cases	140			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

Figure 9.9 - Q2 & Q8 Symmetric Measures

Correlations

			Q2 - HRIS-Transactional (Benefit Admin)	Q8 - HR-enabled Transactional -HR Performance (Benefit Admin-Satis. Motivation. Presense. Retention)
Kendall's tau_b	Q2 - HRIS-Transactional (Benefit Admin)	Correlation Coefficient	1.000	.385**
		Sig. (2-tailed)	.	.000
		N	140	140
	Q8 - HR-enabled Transactional-HR Performance (Benefit Admin-Satis. Motivation. Presense. Retention)	Correlation Coefficient	.385**	1.000
		Sig. (2-tailed)	.000	.
		N	140	140

**. Correlation is significant at the 0.01 level (2-tailed).

Figure 9.10 - Statistical analysis between HRIS-enabled HR transactional practices and HRM performance (Q2 and Q8)

The analysis indicated a statistically significant positive association between HRIS-enabled HR transactional practices and their impact on the HRM performance, $\tau(138) = .385, p < .01$ (i.e. $p = .000$). This means that the HRIS-enabled HR transactional benefit administration practices such as overseeing the health insurance coverage, administering investment and retirement program, *etc.* significantly positively impact the HRM performance that is measured by overall employee satisfaction, motivation, presence (obverse of absenteeism) and retention (obverse of turnover) at 'typical' level. In other words, the null hypothesis is rejected, therefore, the alternative hypothesis **H1: $\tau \neq 0$** is valid.

However, it should be noted that since the value of 'r' (i.e. the correlation coefficient or strength of relationship) is closer to '0' (i.e. $r = .385$), greater portion of the two data sets being compared are discordant, thus to a certain extent, weak in association. In other words, even though the HRIS-enabled HR transactional benefit administration practices such as overseeing the health insurance coverage, administering investment and retirement program, *etc.* significantly positively impact the HRM performance that is measured by overall employee

satisfaction, motivation, presence (obverse of absenteeism) and retention (obverse of turnover), the level of association should be considered ‘weak’ (Morgan *et al.*, 2013, p.145).

Analysis 4: To investigate the relationship between HRIS-enabled HR transactional benefit administration practices such as, overseeing the health insurance coverage, administering investment and retirement program, *etc.* and HRM performance that is measured by overall employee involvement, trust, commitment and social climate between workers and management, a Kendall’s tau-b correlation test was conducted.

Q2 - HRIS-Transactional (Benefit Admin) * Q9 - HR-enabled Transactional-HR Performance (Benefit Admin-Invole.Trust.Loyal.commit.) Crosstabulation									
			Q9 - HR-enabled Transactional-HR Performance (Benefit Admin-Invole.Trust.Loyal.commit.)					Total	
			Strongly disagree	Disagree	Neutral	Agree	Strongly agree		
Q2 - HRIS-Transactional (Benefit Admin)	Strongly disagree	Count	0	0	1	0	0	1	
		Expected Count	.0	.1	.6	.2	.0	1.0	
		% of Total	0.0%	0.0%	0.7%	0.0%	0.0%	0.7%	
	Disagree	Count	3	2	7	0	0	12	
		Expected Count	.3	1.5	7.4	2.3	.4	12.0	
		% of Total	2.1%	1.4%	5.0%	0.0%	0.0%	8.6%	
	Neutral	Count	0	5	37	1	0	43	
		Expected Count	1.2	5.5	26.4	8.3	1.5	43.0	
		% of Total	0.0%	3.6%	26.4%	0.7%	0.0%	30.7%	
	Agree	Count	0	9	32	18	0	59	
		Expected Count	1.7	7.6	36.2	11.4	2.1	59.0	
		% of Total	0.0%	6.4%	22.9%	12.9%	0.0%	42.1%	
	Strongly agree	Count	1	2	9	8	5	25	
		Expected Count	.7	3.2	15.4	4.8	.9	25.0	
		% of Total	0.7%	1.4%	6.4%	5.7%	3.6%	17.9%	
	Total		Count	4	18	86	27	5	140
			Expected Count	4.0	18.0	86.0	27.0	5.0	140.0
			% of Total	2.9%	12.9%	61.4%	19.3%	3.6%	100.0%

Figure 9.11 - Q2 & Q9 Cross Tabulation

Symmetric Measures

		Value	Asymp. Std. Error ^a	Approx. T ^b	Approx. Sig.
Ordinal by Ordinal	Kendall's tau-b	.344	.071	4.519	.000
N of Valid Cases		140			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

Figure 9.12 - Q2 & Q9 Symmetric Measures

Correlations

			Q2 - HRIS-Transactional (Benefit Admin)	Q9 - HR-enabled Transactional-HR Performance (Benefit Admin-Invole.Trust.Loyal.commit.)
Kendall's tau_b	Q2 - HRIS-Transactional (Benefit Admin)	Correlation Coefficient	1.000	.344**
		Sig. (2-tailed)	.	.000
		N	140	140
	Q9 - HR-enabled Transactional-HR Performance (Benefit Admin-Invole.Trust.Loyal.commit.)	Correlation Coefficient	.344**	1.000
		Sig. (2-tailed)	.000	.
		N	140	140

** . Correlation is significant at the 0.01 level (2-tailed).

Figure 9.13 - Statistical analysis between HRIS-enabled HR transactional practices and HRM performance (Q2 and Q9)

The analysis indicated a statistically significant positive association between HRIS-enabled HR transactional practices and their impact on the HRM performance, $\tau (138) = .344, p < .01$ (i.e. $p = .000$). This means that the HRIS-enabled HR transactional benefit administration practices such as overseeing the health insurance coverage, administering investment and retirement program, etc. significantly positively impact the HRM performance that is measured by overall employee involvement, trust, commitment and social climate between workers and management at ‘typical’ level. In other words, the null hypothesis is rejected, therefore, the alternative hypothesis **H1: $\tau \neq 0$** is valid.

However, it should be noted that since the value of ‘r’ (i.e. the correlation coefficient or strength of relationship) is closer to ‘0’ (i.e. $r = .344$), greater portion of the two data sets being compared are discordant, thus to a certain extent, weak in association. In other words, even though the HRIS-enabled HR transactional benefit administration practices such as overseeing the health insurance coverage, administering investment and retirement program, etc. significantly positively impact the HRM performance that is measured by overall employee involvement, trust, commitment and social climate between workers and management, the level of association should be considered ‘weak’ (Morgan et al., 2013, p.145).

9.2.2 The impact of HRIS-enabled HR traditional practices on HRM performance

The analyses in this section are based on the following hypothesis:

Null Hypothesis 2 (H2₀): HRIS-enabled HR traditional practices do not significantly impact the HRM Performance.

Alternative Hypothesis 2 (H2): HRIS-enabled HR traditional practices significantly impact the HRM Performance.

The following table depicts the summary of the Kendall’s tau-b association analyses that the researcher carried out to determine if there is any impact of HRIS-enabled HR traditional practices significantly impact the HRM performance:

Table 9.4 - Results: The impact of HRIS-enabled HR traditional practices on HRM performance

Kendall's tau-b Association	'r' (Correlation Coefficient <u>or</u> Strength of Relationship)	Association	p-value	Significance
Q3 & Q10 (Analysis 5)	+0.346**	Typical	0.000	Positively Significant at 0.01 level
Q3 & Q11 (Analysis 6)	+0.397**	Typical	0.000	Positively Significant at 0.01 level
Q4 & Q12 (Analysis 7)	+0.505**	Larger than Typical	0.000	Positively Significant at 0.01 level
Q4 & Q13 (Analysis 8)	+0.490**	Larger than Typical	0.000	Positively Significant at 0.01 level

*p < 0.05

**p < 0.01

***p < 0.001

Analysis 5: To investigate the relationship between HRIS-enabled HR traditional management practices such as recruitment, selection, training, promotion and compensation, and HRM performance that is measured by overall employee satisfaction, motivation, presence (obverse of absenteeism) and retention (obverse of turnover), a Kendall's tau-b correlation test was conducted.

Q3 - HRIS-Traditional (Rec.Select.Train.Promo.Comp.etc.) * Q10 - HR-enabled Traditional-HR Performance (Rec.Select.Train.Promo.Comp.etc.-Satis.Motivation.Presense.Retention) Crosstabulation

			Q10 - HR-enabled Traditional-HR Performance (Rec.Select.Train.Promo.Comp.etc.-Satis.Motivation.Presense.Retention)					Total
			Strongly disagree	Disagree	Neutral	Agree	Strongly agree	
Q3 - HRIS-Traditional (Rec.Select.Train.Promo.Comp.etc.)	Strongly disagree	Count	0	1	1	0	0	2
		Expected Count	.0	.2	1.3	.4	.1	2.0
		% of Total	0.0%	0.7%	0.7%	0.0%	0.0%	1.4%
	Disagree	Count	0	7	7	1	0	15
		Expected Count	.3	1.5	9.8	3.0	.4	15.0
		% of Total	0.0%	5.0%	5.0%	0.7%	0.0%	10.7%
	Neutral	Count	1	2	48	7	0	58
		Expected Count	1.2	5.8	37.7	11.6	1.7	58.0
		% of Total	0.7%	1.4%	34.3%	5.0%	0.0%	41.4%
	Agree	Count	2	4	29	15	1	51
		Expected Count	1.1	5.1	33.2	10.2	1.5	51.0
		% of Total	1.4%	2.9%	20.7%	10.7%	0.7%	36.4%
	Strongly agree	Count	0	0	6	5	3	14
		Expected Count	.3	1.4	9.1	2.8	.4	14.0
		% of Total	0.0%	0.0%	4.3%	3.6%	2.1%	10.0%
Total	Count	3	14	91	28	4	140	
	Expected Count	3.0	14.0	91.0	28.0	4.0	140.0	
	% of Total	2.1%	10.0%	65.0%	20.0%	2.9%	100.0%	

Figure 9.14 - Q3 & Q10 Cross Tabulation

Symmetric Measures

	Value	Asymp. Std. Error ^a	Approx. T ^b	Approx. Sig.
Ordinal by Ordinal Kendall's tau-b	.346	.074	4.332	.000
N of Valid Cases	140			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

Figure 9.15 - Q3 & Q10 Symmetric Measures

Correlations				
			Q3 - HRIS-Traditional (Rec.Select.Train.Promo.Comp.etc.)	Q10 - HR-enabled Traditional-HR Performance (Rec.Select.Train.Promo.Comp.etc.-Satis.Motivation.Presense.Retention)
Kendall's tau_b	Q3 - HRIS-Traditional (Rec.Select.Train.Promo.Comp.etc.)	Correlation Coefficient	1.000	.346**
		Sig. (2-tailed)	.	.000
		N	140	140
	Q10 - HR-enabled Traditional-HR Performance (Rec.Select.Train.Promo.Comp.etc.-Satis.Motivation.Presense.Retention)	Correlation Coefficient	.346**	1.000
Sig. (2-tailed)		.000	.	
N		140	140	
**. Correlation is significant at the 0.01 level (2-tailed).				

Figure 9.16 - Statistical analysis between HRIS-enabled HR traditional practices and HRM performance (Q3 and Q10)

The analysis indicated a statistically significant positive association between HRIS-enabled HR traditional practices and their impact on the HRM performance, $\tau(138) = .346, p < .01$ (i.e. $p = .000$). This means that the HRIS-enabled HR traditional management practices such as recruitment, selection, training, promotion and compensation, significantly positively impact the HRM performance that is measured by overall employee satisfaction, motivation, presence (obverse of absenteeism) and retention (obverse of turnover) at 'typical' level. In other words, the null hypothesis is rejected, therefore, the alternative hypothesis **H2: $\tau \neq 0$** is valid.

Analysis 6: To investigate the relationship between HRIS-enabled HR traditional management practices such as recruitment, selection, training, promotion and compensation, and HRM performance that is measured by overall employee involvement, trust, commitment and social climate between workers and management, a Kendall's tau-b correlation test was conducted.

Q3 - HRIS-Traditional (Rec.Select.Train.Promo.Comp.etc.) * Q11 - HR-enabled Traditional-HR Performance (Rec.Select.Train.Promo.Comp.etc.- Invole.Trust.Loyal.commit.) Crosstabulation

			Q11 - HR-enabled Traditional-HR Performance (Rec.Select.Train.Promo.Comp.etc.- Invole.Trust.Loyal.commit.)					Total
			Strongly disagree	Disagree	Neutral	Agree	Strongly agree	
Q3 - HRIS-Traditional (Rec.Select.Train.Promo.Comp.etc.)	Strongly disagree	Count	0	1	1	0	0	2
		Expected Count	.0	.3	1.3	.4	.0	2.0
		% of Total	0.0%	0.7%	0.7%	0.0%	0.0%	1.4%
	Disagree	Count	0	10	5	0	0	15
		Expected Count	.3	1.9	9.5	2.9	.3	15.0
		% of Total	0.0%	7.1%	3.6%	0.0%	0.0%	10.7%
	Neutral	Count	1	1	50	6	0	58
		Expected Count	1.2	7.5	36.9	11.2	1.2	58.0
		% of Total	0.7%	0.7%	35.7%	4.3%	0.0%	41.4%
	Agree	Count	2	6	28	15	0	51
		Expected Count	1.1	6.6	32.4	9.8	1.1	51.0
		% of Total	1.4%	4.3%	20.0%	10.7%	0.0%	36.4%
	Strongly agree	Count	0	0	5	6	3	14
		Expected Count	.3	1.8	8.9	2.7	.3	14.0
		% of Total	0.0%	0.0%	3.6%	4.3%	2.1%	10.0%
	Total	Count	3	18	89	27	3	140
		Expected Count	3.0	18.0	89.0	27.0	3.0	140.0
		% of Total	2.1%	12.9%	63.6%	19.3%	2.1%	100.0%

Figure 9.17 - Q3 & Q11 Cross Tabulation

Symmetric Measures

	Value	Asymp. Std. Error ^a	Approx. T ^b	Approx. Sig.
Ordinal by Ordinal Kendall's tau-b	.397	.074	4.908	.000
N of Valid Cases	140			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

Figure 9.18 - Q3 & Q11 Symmetric Measures

Correlations

			Q3 - HRIS-Traditional (Rec.Select. Train.Promo. Comp.etc.)	Q11 - HR-enabled Traditional-HR Performance (Rec.Select. Train.Promo. Comp.etc.- Invole.Trust.Loyal. commit.)
Kendall's tau_b	Q3 - HRIS-Traditional (Rec.Select. Train.Promo. Comp.etc.)	Correlation Coefficient	1.000	.397*
		Sig. (2-tailed)	.	.000
		N	140	140
	Q11 - HR-enabled Traditional-HR Performance (Rec.Select. Train.Promo. Comp.etc.- Invole.Trust.Loyal. commit.)	Correlation Coefficient	.397**	1.000
		Sig. (2-tailed)	.000	.
		N	140	140

**. Correlation is significant at the 0.01 level (2-tailed).

Figure 9.19 - Statistical analysis between HRIS-enabled HR traditional practices and HRM performance (Q3 and Q11)

The analysis indicated a statistically significant positive association between HRIS-enabled HR traditional practices and their impact on the HRM performance, $\tau(138) = .397, p < .01$ (i.e. $p = .000$). This means that the HRIS-enabled HR traditional management practices such as recruitment, selection, training, promotion and compensation, significantly positively impact the HRM performance that is measured by overall employee involvement, trust, commitment and social climate between workers and management at ‘typical’ level. In other words, the null hypothesis is rejected, therefore, the alternative hypothesis **H2: $\tau \neq 0$** is valid.

Analysis 7: To investigate the relationship between HRIS-enabled HR traditional management practices such as performance management, rewards, career development and communication, and HRM performance that is measured by overall employee satisfaction, motivation, presence (obverse of absenteeism) and retention (obverse of turnover), a Kendall’s tau-b correlation test was conducted.

Q4 - HRIS-Traditional (Peform_Mgmt.Reward.Career_Dev.etc.) * Q12 - HR-enabled Traditional-HR Performance (Peform_Mgmt.Reward.Career_Dev.etc.- Satis.Motivation.Presense.Retention) Crosstabulation

			Q12 - HR-enabled Traditional-HR Performance (Peform_Mgmt.Reward_Career_Dev.etc.- Satis.Motivation.Presense.Retention)				Total
			Disagree	Neutral	Agree	Strongly agree	
Q4 - HRIS-Traditional (Peform_Mgmt.Reward.Career_Dev.etc.)	Strongly disagree	Count	0	3	0	0	3
		Expected Count	.3	2.0	.6	.1	3.0
		% of Total	0.0%	2.1%	0.0%	0.0%	2.1%
	Disagree	Count	7	13	0	0	20
		Expected Count	1.9	13.6	3.9	.7	20.0
		% of Total	5.0%	9.3%	0.0%	0.0%	14.3%
	Neutral	Count	4	61	6	1	72
		Expected Count	6.7	48.9	13.9	2.6	72.0
		% of Total	2.9%	43.6%	4.3%	0.7%	51.4%
	Agree	Count	2	17	16	1	36
		Expected Count	3.3	24.4	6.9	1.3	36.0
		% of Total	1.4%	12.1%	11.4%	0.7%	25.7%
	Strongly agree	Count	0	1	5	3	9
		Expected Count	.8	6.1	1.7	.3	9.0
		% of Total	0.0%	0.7%	3.6%	2.1%	6.4%
Total	Count	13	95	27	5	140	
	Expected Count	13.0	95.0	27.0	5.0	140.0	
	% of Total	9.3%	67.9%	19.3%	3.6%	100.0%	

Figure 9.20 - Q4 & Q12 Cross Tabulation

Symmetric Measures

	Value	Asymp. Std. Error ^a	Approx. T ^b	Approx. Sig.
Ordinal by Ordinal Kendall's tau-b	.505	.064	6.560	.000
N of Valid Cases	140			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

Figure 9.21 - Q4 & Q12 Symmetric Measures

Correlations

			Q4 - HRIS-Traditional (Peform_Mgmt.Reward.Career_Dev.etc.)	Q12 - HR-enabled Traditional-HR Performance (Peform_Mgmt.Reward.Career_Dev.etc.- Satis.Motivation.Presense.Retention)
Kendall's tau_b	Q4 - HRIS-Traditional (Peform_Mgmt.Reward.Career_Dev.etc.)	Correlation Coefficient	1.000	.505**
		Sig. (2-tailed)	.	.000
	Q12 - HR-enabled Traditional-HR Performance (Peform_Mgmt.Reward.Career_Dev.etc.- Satis.Motivation.Presense.Retention)	N	140	140
		Correlation Coefficient	.505**	1.000
		Sig. (2-tailed)	.000	.
		N	140	140

** . Correlation is significant at the 0.01 level (2-tailed).

Figure 9.22 - Statistical analysis between HRIS-enabled HR traditional practices and HRM performance (Q4 and Q12)

The analysis indicated a statistically significant positive association between HRIS-enabled HR traditional practices and their impact on the HRM performance, **tau (138) = .505, $p < .01$ (i.e. $p = .000$)**. This means that the HRIS-enabled HR traditional management practices such as performance management, rewards, career development and communication, significantly positively impact the HRM performance that is measured by overall employee satisfaction, motivation, presence (obverse of absenteeism) and retention (obverse of turnover) at **'larger**

than typical' level. In other words, the null hypothesis is rejected, therefore, the alternative hypothesis **H2: $\tau \neq 0$** is valid.

Analysis 8: To investigate the relationship between HRIS-enabled HR traditional management practices such as performance management, rewards, career development and communication, and HRM performance that is measured by overall employee involvement, trust, commitment and social climate between workers and management, a Kendall's tau-b correlation test was conducted.

			Q13 - HR-enabled Traditional-HR Performance (Peform_Mgmt.Reward.Career_Dev.etc.- Invole.Trust.Loyal.commit.)					Total
			Strongly disagree	Disagree	Neutral	Agree	Strongly agree	
Q4 - HRIS-Traditional (Peform_Mgmt.Reward.Career_Dev.etc.)	Strongly disagree	Count	0	0	3	0	0	3
		Expected Count	.0	.3	2.0	.5	.1	3.0
		% of Total	0.0%	0.0%	2.1%	0.0%	0.0%	2.1%
	Disagree	Count	0	9	11	0	0	20
		Expected Count	.3	2.1	13.4	3.6	.6	20.0
		% of Total	0.0%	6.4%	7.9%	0.0%	0.0%	14.3%
	Neutral	Count	1	3	63	4	1	72
		Expected Count	1.0	7.7	48.3	12.9	2.1	72.0
		% of Total	0.7%	2.1%	45.0%	2.9%	0.7%	51.4%
	Agree	Count	1	3	16	16	0	36
		Expected Count	.5	3.9	24.2	6.4	1.0	36.0
		% of Total	0.7%	2.1%	11.4%	11.4%	0.0%	25.7%
	Strongly agree	Count	0	0	1	5	3	9
		Expected Count	.1	1.0	6.0	1.6	.3	9.0
		% of Total	0.0%	0.0%	0.7%	3.6%	2.1%	6.4%
Total	Count	2	15	94	25	4	140	
	Expected Count	2.0	15.0	94.0	25.0	4.0	140.0	
	% of Total	1.4%	10.7%	67.1%	17.9%	2.9%	100.0%	

Figure 9.23 - Q4 & Q13 Cross Tabulation

Symmetric Measures

	Value	Asymp. Std. Error ^a	Approx. T ^b	Approx. Sig.
Ordinal by Ordinal Kendall's tau-b	.490	.072	5.912	.000
N of Valid Cases	140			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

Figure 9.24 - Q4 & Q13 Symmetric Measures

Correlations

			Q4 - HRIS-Traditional (Peform_Mgmt.Reward.Career_Dev.etc.)	Q13 - HR-enabled Traditional-HR Performance (Peform_Mgmt.Reward.Career_Dev.etc.- Invole.Trust.Loyal.commit.)
Kendall's tau_b	Q4 - HRIS-Traditional (Peform_Mgmt.Reward.Career_Dev.etc.)	Correlation Coefficient	1.000	.490**
		Sig. (2-tailed)	.	.000
		N	140	140
	Q13 - HR-enabled Traditional-HR Performance (Peform_Mgmt.Reward.Career_Dev.etc.- Invole.Trust.Loyal.commit.)	Correlation Coefficient	.490**	1.000
		Sig. (2-tailed)	.000	.
		N	140	140

** . Correlation is significant at the 0.01 level (2-tailed).

Figure 9.25 - Statistical analysis between HRIS-enabled HR traditional practices and HRM performance (Q4 and Q13)

The analysis indicated a statistically significant positive association between HRIS-enabled HR traditional practices and their impact on the HRM performance, **tau (138) = .490, $p < .01$** (*i.e.* $p = .000$). This means that the HRIS-enabled HR traditional management practices such as performance management, rewards, career development and communication, significantly positively impact the HRM performance that is measured by overall employee involvement, trust, commitment and social climate between workers and management at **‘larger than typical’** level. In other words, the null hypothesis is rejected, therefore, the alternative hypothesis **H2: $\tau \neq 0$** is valid.

9.2.3 The impact of HRIS-enabled HR transformational practices on HRM performance

The analyses in this section are based on the following hypothesis:

Null Hypothesis 3 (H3_o): HRIS-enabled HR transformational practices do not significantly impact the HRM Performance.

Alternative Hypothesis 3 (H3): HRIS-enabled HR transformational practices significantly impact the HRM Performance.

The following table depicts the summary of the Kendall’s tau-b association analyses that the researcher carried out to determine if there is any impact of HRIS-enabled HR transformational practices significantly impact the HRM Performance:

Table 9.5 - Results: The impact of HRIS-enabled HR transformational practices on HRM performance

Kendall’s tau-b Association	‘r’ (Correlation Coefficient <u>or</u> Strength of Relationship)	Association	p-value	Significance
Q5 & Q14 (Analysis 9)	+0.406**	Typical	0.000	Positively Significant at 0.01 level
Q5 & Q15 (Analysis 10)	+0.436**	Typical	0.000	Positively Significant at 0.01 level

* $p < 0.05$

** $p < 0.01$

*** $p < 0.001$

Analysis 9: To investigate the relationship between HRIS-enabled HR transformational management practices such as strategic planning, organizational development, knowledge management and change management, and HRM performance that is measured by overall employee satisfaction, motivation, presence (obverse of absenteeism) and retention (obverse of turnover), a Kendall’s tau-b correlation test was conducted.

Q5 - HRIS-Transformational (Strategic_Plan.Org_Dev.Know_Mgmt.Change_Mgmt.) * Q14 - HR-enabled Transformational-HR Performance (Strategic_Plan.Org_Dev.Know_Mgmt.Change_Mgmt. - Satis.Motivation.Presense.Retention) Crosstabulation

			Q14 - HR-enabled Transformational-HR Performance (Strategic_Plan.Org_Dev. Know_Mgmt.Change_Mgmt. - Satis.Motivation.Presense.Retention)					Total
			Strongly disagree	Disagree	Neutral	Agree	Strongly agree	
Q5 - HRIS- Transformational (Strategic_Plan.Org_Dev. Know_Mgmt. Change_Mgmt.)	Strongly disagree	Count	0	1	2	0	0	3
		Expected Count	.1	.3	2.1	.5	.1	3.0
		% of Total	0.0%	0.7%	1.4%	0.0%	0.0%	2.1%
	Disagree	Count	0	7	16	0	0	23
		Expected Count	.5	2.3	15.9	3.5	.8	23.0
		% of Total	0.0%	5.0%	11.4%	0.0%	0.0%	16.4%
	Neutral	Count	0	3	62	5	0	70
		Expected Count	1.5	7.0	48.5	10.5	2.5	70.0
		% of Total	0.0%	2.1%	44.3%	3.6%	0.0%	50.0%
	Agree	Count	3	3	16	12	2	36
		Expected Count	.8	3.6	24.9	5.4	1.3	36.0
		% of Total	2.1%	2.1%	11.4%	8.6%	1.4%	25.7%
	Strongly agree	Count	0	0	1	4	3	8
		Expected Count	.2	.8	5.5	1.2	.3	8.0
		% of Total	0.0%	0.0%	0.7%	2.9%	2.1%	5.7%
Total	Count	3	14	97	21	5	140	
	Expected Count	3.0	14.0	97.0	21.0	5.0	140.0	
	% of Total	2.1%	10.0%	69.3%	15.0%	3.6%	100.0%	

Figure 9.26 - Q5 & Q14 Symmetric Measures

Symmetric Measures

	Value	Asymp. Std. Error ^a	Approx. T ^b	Approx. Sig.
Ordinal by Ordinal Kendall's tau-b	.406	.082	4.544	.000
N of Valid Cases	140			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

Figure 9.27 - Q5 & Q14 Symmetric Measures

Correlations

			Q5 - HRIS-Transformational (Strategic_Plan.Org_Dev.Know_Mgmt.Change_Mgmt.)	Q14 - HR-enabled Transformational-HR Performance (Strategic_Plan.Org_Dev.Know_Mgmt.Change_Mgmt. - Satis.Motivation.Presense.Retention)
Kendall's tau_b	Q5 - HRIS-Transformational (Strategic_Plan.Org_Dev.Know_Mgmt.Change_Mgmt.)	Correlation Coefficient	1.000	.406*
		Sig. (2-tailed)	.	.000
		N	140	140
	Q14 - HR-enabled Transformational-HR Performance (Strategic_Plan.Org_Dev.Know_Mgmt.Change_Mgmt. - Satis.Motivation.Presense.Retention)	Correlation Coefficient	.406**	1.000
		Sig. (2-tailed)	.000	.
		N	140	140

**. Correlation is significant at the 0.01 level (2-tailed).

Figure 9.28 - Statistical analysis between HRIS-enabled HR transformational practices and HRM performance (Q5 and Q14)

The analysis indicated a statistically significant positive association between HRIS-enabled HR transformational practices and their impact on the HRM Performance, $\tau(138) = .406, p < .01$ (i.e. $p = .000$). This means that the HRIS-enabled HR transformational management practices such as strategic planning, organizational development, knowledge management and change management significantly positively impact the HRM Performance that is measured by overall

employee satisfaction, motivation, presence (obverse of absenteeism) and retention (obverse of turnover) at ‘typical’ level. In other words, the null hypothesis is rejected, therefore, the alternative hypothesis **H3: $\tau \neq 0$** is valid.

Analysis 10: To investigate the relationship between HRIS-enabled HR transformational management practices such as strategic planning, organizational development, knowledge management and change management, and HRM performance that is measured by overall employee involvement, trust, commitment and social climate between workers and management, a Kendall’s tau-b correlation test was conducted.

Q5 - HRIS-Transformational (Strategic_Plan.Org_Dev.Know_Mgmt.Change_Mgmt.) * Q15 - HR-enabled Transformational-HR Performance (Strategic_Plan.Org_Dev.Know_Mgmt.Change_Mgmt. - Invol.Trust.Loyal.commit.) Crosstabulation									
			Q15 - HR-enabled Transformational-HR Performance (Strategic_Plan.Org_Dev.Know_Mgmt.Change_Mgmt. - Invol.Trust.Loyal.commit.)					Total	
			Strongly disagree	Disagree	Neutral	Agree	Strongly agree		
Q5 - HRIS-Transformational (Strategic_Plan.Org_Dev.Know_Mgmt.Change_Mgmt.)	Strongly disagree	Count	1	0	2	0	0	3	
		Expected Count	.1	.3	2.1	.5	.1	3.0	
		% of Total	0.7%	0.0%	1.4%	0.0%	0.0%	2.1%	
	Disagree	Count	0	7	16	0	0	23	
		Expected Count	.7	2.0	15.9	3.6	.8	23.0	
		% of Total	0.0%	5.0%	11.4%	0.0%	0.0%	16.4%	
	Neutral	Count	0	2	64	4	0	70	
		Expected Count	2.0	6.0	48.5	11.0	2.5	70.0	
		% of Total	0.0%	1.4%	45.7%	2.9%	0.0%	50.0%	
	Agree	Count	3	3	13	15	2	36	
		Expected Count	1.0	3.1	24.9	5.7	1.3	36.0	
		% of Total	2.1%	2.1%	9.3%	10.7%	1.4%	25.7%	
	Strongly agree	Count	0	0	2	3	3	8	
		Expected Count	.2	.7	5.5	1.3	.3	8.0	
		% of Total	0.0%	0.0%	1.4%	2.1%	2.1%	5.7%	
Total	Count	4	12	97	22	5	140		
	Expected Count	4.0	12.0	97.0	22.0	5.0	140.0		
	% of Total	2.9%	8.6%	69.3%	15.7%	3.6%	100.0%		

Figure 9.29 - Q5 & Q15 Symmetric Measures

Symmetric Measures

	Value	Asymp. Std. Error ^a	Approx. T ^b	Approx. Sig.
Ordinal by Ordinal Kendall's tau-b	.436	.082	4.836	.000
N of Valid Cases	140			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

Figure 9.30 - Q5 & Q15 Symmetric Measures

Correlations

			Q5 - HRIS-Transformational (Strategic_Plan.Org_Dev.Know_Mgmt.Change_Mgmt.)	Q15 - HR-enabled Transformational-HR Performance (Strategic_Plan.Org_Dev.Know_Mgmt.Change_Mgmt. - Involvement.Trust.Loyal.commit.)
Kendall's tau_b	Q5 - HRIS-Transformational (Strategic_Plan.Org_Dev.Know_Mgmt.Change_Mgmt.)	Correlation Coefficient	1.000	.436**
		Sig. (2-tailed)	.	.000
		N	140	140
	Q15 - HR-enabled Transformational-HR Performance (Strategic_Plan.Org_Dev.Know_Mgmt.Change_Mgmt. - Involvement.Trust.Loyal.commit.)	Correlation Coefficient	.436**	1.000
		Sig. (2-tailed)	.000	.
		N	140	140

** . Correlation is significant at the 0.01 level (2-tailed).

Figure 9.31 - Statistical analysis between HRIS-enabled HR transformational practices and HRM performance (Q5 and Q15)

The analysis indicated a statistically significant positive association between HRIS-enabled HR transformational practices and their impact on the HRM performance, $\tau(138) = .436, p < .01$ (*i.e.* $p = .000$). This means that the HRIS-enabled HR transformational management practices such as strategic planning, organizational development, knowledge management and change management significantly positively impact the HRM performance that is measured by overall employee involvement, trust, commitment and social climate between workers and management at ‘**typical**’ level. In other words, the null hypothesis is rejected, therefore, the alternative hypothesis **H3: $\tau \neq 0$** is valid.

9.3 Conclusion

A Kendall tau-b correlation was used to determine the effect of HRIS-enabled HR practices (namely transactional, traditional and transformational) on the HRM performance. In order to conduct the Kendall tau-b correlation, based on the survey questionnaire design, ten separate analyses were conducted. The ten analyses were then subdivided into three groups; the HRIS-enabled HR transactional practices on HRM performance (Analysis 1-4), the HRIS-enabled HR traditional practices on HRM performance (Analysis 5-8), and the HRIS-enabled HR transformational practices on HRM performance (Analysis 9-10).

For the first group, the HRIS-enabled HR transactional practices compared to HRM performance, the association results varied between ‘smaller than typical’ and ‘typical’. However, due to the fact that the value of ‘ r ’ (*i.e.* the correlation coefficient or strength of relationship) is closer to zero, the level of association should be considered ‘weak’ in this group.

For the second group, the HRIS-enabled HR traditional practices compared to HRM performance, the association results varied between ‘typical’ and ‘larger than typical’.

Finally, for the third group, the HRIS-enabled HR transformational practices compared to HRM performance, the association results were both ‘typical’.

These associations all relate to the first, and main research question: *Does the HRIS-enabled HR practices (namely transactional, traditional and transformational) significantly impact the HRM Performance?* In conclusion, while rejecting the null hypotheses, since all HRIS-enabled HR practices significantly positively impact the HRM performance the following alternative hypotheses associated with this research question can safely be accepted:

Hypothesis 1 (H1): HRIS-enabled HR transactional practices significantly impact the HRM performance.

Hypothesis 2 (H2): HRIS-enabled HR traditional practices significantly impact the HRM performance.

Hypothesis 3 (H3): HRIS-enabled HR transformational practices significantly impact the HRM performance.

The following chapter will discuss the results of the second and third research questions:

Does the type of an organization significantly impacts the HRIS-enabled HRM performance?

And,

Does the size of an organization significantly impacts the HRIS-enabled HRM performance?

Chapter 10

Impact of organization type and organization size on HRIS-enabled HR practices and HRM performance

A cumulative odds ordinal logistic regression with proportional odds was run to determine the effect of organization type and organization size on the belief that organization type and organization size significantly impacts the human resources information system (HRIS)-enabled human resources (HR) practices, namely, transactional, traditional and transformational, and human resources management (HRM).

10.1 The Assumptions for cumulative odds ordinal logistic regression

For an ordinal logistic regression to be able to provide a valid result, the following assumptions need to be satisfied (Laerd Statistics, 2015):

1. One dependent variable that is measured at the ordinal level.
2. One or more independent variables that are continuous, ordinal or categorical (nominal).
3. There is no multicollinearity.
4. There are proportional odds.
5. The model meets the model-fit requirements

In this data set, both dependent variables are ordinal variables that are measured in a 5-point Likert scale and independent variables are categorical variables. The multicollinearity test determines if two or more independent variables that are highly correlated with each other. Proportional odds assumption means that each independent variable has an identical effect at each cumulative split of the ordinal dependent variable. Finally, the likelihood-ratio analysis and the test of model effects determine whether there is a statistical significance, *i.e.* the independent variable add value to the prediction of the dependent variable.

As it was determined in Chapter 8, since the frequency distribution of the variables are not normal (*i.e.* as tabulated in Table 8.3 and Table 8.4, all of the dependent variables are either positively or negatively skewed) in these OLR analyses, the Chi-Square values (*i.e.* the χ^2 values) were calculated.

“The Chi Square (χ^2) test is undoubtedly the most important and most used member of the nonparametric family of statistical tests. Chi Square is employed to test the difference between an actual sample and another hypothetical or previously established distribution such as that which may be expected due to chance or probability. Chi Square can also be used to test differences between two or more actual samples”,

informs Key (1997). Therefore, all model-fit requirement tests in this analysis, use the p-values from the Chi-Square calculations to determine if the independent variables have statistically significant effect on the dependent variables.

Once each model-fit requirement is satisfied then the analysis moves on to the next step to measure the strength of association, *i.e.* using the value of R^2 (*exponential function*). In the OLR, usually the strength of association is determined by three commonly used statistics, namely Cox and Snell R^2 , Nagelkerke's R^2 and McFadden's R^2 (Laerd Statistics, 2015). It should be noted that the strength of association tests are done only when the model-fit requirement tests are satisfied to derive the outcome from proportional odds ordinal logistic regression. In other words, the OLR analysis employs both Chi-Square values and R^2 values to derive the outcome from proportional odds ordinal logistic regression.

Based on the above assumptions, two separate sets of ordinal logistic regressions were done to determine the impact of organization type and organization size (*i.e.* the independent variables) on the HRIS-enabled HR practices and HRM performance (*i.e.* the dependent variables). These two sets are:

1. The impact of organization type on the HRIS-enabled HR practices and HRM performance.
2. The impact of organization size on the HRIS-enabled HR practices and HRM performance.

In order to conduct the cumulative odds ordinal logistic regression (OLR) with proportional odds, based on the survey questionnaire design described in Chapter 7, Research Methods: Measures (Table 7.1), fifteen individual separate analyses are needed for each independent variables (*i.e.* one set of fifteen OLR analyses for organization type and another set of fifteen OLR analyses for organization size). For the ease of understanding, these fifteen analyses are categorized into two sections; the first section includes five analyses that test the impact of

organization type or organization size on HR practices, namely transactional, traditional and transformational. The ten analyses in the next section test the impact of organization type or organization size on HRM performance.

While section 10.2 below analyses the impact of organization type on the HRIS-enabled HR practices and HRM performance, section 10.3 analyses the impact of organization size on the HRIS-enabled HR practices and HRM performance.

The following table summarizes these details:

Table 10.1 - The impact of organization type or organization size on HRIS-enabled HR practices and HRM performance

Section 1: Organization type or size versus HR practices			
Analysis	Independent variable	Dependent variable	Analysis type
1	Organization type or size	Question 1	Organization type vs. HRIS-enabled HR transactional practices
2	Organization type or size	Question 2	
3	Organization type or size	Question 3	
4	Organization type or size	Question 4	Organization type vs. HRIS-enabled HR traditional practices
5	Organization type or size	Question 5	Organization type vs. HRIS-enabled HR transformational practices
Section 2: Organization type or size versus HRIS-enabled HRM performance			
6	Organization type or size	Question 6	HRIS-enabled HR transactional practices and HRM performance relationship
7	Organization type or size	Question 7	
8	Organization type or size	Question 8	
9	Organization type or size	Question 9	
10	Organization type or size	Question 10	HRIS-enabled HR traditional practices and HRM performance relationship
11	Organization type or size	Question 11	
12	Organization type or size	Question 12	
13	Organization type or size	Question 13	HRIS-enabled HR transformational practices and HRM performance relationship
14	Organization type or size	Question 14	
15	Organization type or size	Question 15	

Note: The full details of these analyses are attached to the ‘Appendix E’ section of this thesis.

10.2 Impact of organization type on HRIS-enabled HR practices and HRM performance: Ordinal logistic regression

The analyses in this section are based on the following hypothesis:

Null Hypothesis 4 (H4₀): Organization type does not significantly impact the HRIS-enabled HRM performance model.

Hypothesis 4 (H4): Organization type significantly impacts the HRIS-enabled HRM performance model.

10.2.1 Section 1 - Organization type vs. HRIS-enabled HR practices results and discussion

Table 10.2 depicts the summary of the ordinal regression analyses that the researcher carried out to determine if there is any impact of organization type on HRIS-enabled HR practices.

IMPORTANT NOTE: Please note that the ordinal logistic regression (OLR) analyses below are based on the tutorial lessons that the researcher took from Laerd Statistics (2015). The templates used here to analyse the answers are, therefore, directly quoted with the permission from Laerd Statistics.

Analysis 1: A cumulative odds ordinal logistic regression with proportional odds was run to determine the effect of organization type on the belief that Organization type significantly influences the Human Resources Information System (HRIS)-enabled HR transactional day-to-day record keeping practices, such as entering payroll information, employee status changes, *etc.*

The results were analysed under three categories, namely test for multicollinearity, proportional odds (PLUM), model fit (PLUM and GENLIN) and test of model effects (GENLIN).

Test for multicollinearity:

Coefficients ^a			
Model		Collinearity Statistics	
		Tolerance	VIF
1	Private	.442	2.263
	Government	.509	1.964
	Semi_Government	.565	1.770

a. Dependent Variable: Q1 - HRIS-
Transactional (Day2Day)

Since all the Tolerance values are greater than 0.1 (the lowest is 0.442) and VIF values are much less than 10, therefore, **there is no problem with collinearity** in this particular data set.

Proportional Odds

The assumption of proportional odds is fundamental to the particular type of (cumulative) ordinal logistic regression model. This assumption means that each independent variable has an identical effect at each cumulative split of the ordinal dependent variable.

- This assumption can be tested formally using the statistical test that is generated when the test of parallel lines option in the **Ordinal Regression: Output** dialogue box is selected and the **Test of Parallel Lines** table is presented.

Test of Parallel Lines^a

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Null Hypothesis	41.867			
General	32.674 ^b	9.192 ^c	9	.420

The null hypothesis states that the location parameters (slope coefficients) are the same across response categories.

a. Link function: Logit.

b. The log-likelihood value cannot be further increased after maximum number of step-halving.

c. The Chi-Square statistic is computed based on the log-likelihood value of the last iteration of the general model. Validity of the test is uncertain.

- This test works by comparing the model fit (the "**-2 Log Likelihood**" column) between two different cumulative odds models.
- The two models that are compared are proportional odds model (the "**Null Hypothesis**" row) and a cumulative odds model *without* the proportional odds constraint/assumption (the "**General**" row); *i.e.*, a model where the slope coefficients (relationship) are allowed to be different for each cumulative logit.
- If the assumption of proportional odds is met, one would expect the difference in model fit (the "**Chi-square**" column) between these two models to be small and not statistically significant ($p > .05$).
- Alternatively, if the assumption of proportional odds is violated, one would expect the difference in fit between these two models to be large and statistically significant ($p < .05$).
- The statistical significance level (p -value) of this test can be found in the "**Sig.**" column.
- In this analysis, $p = .420$, which is greater than .05 and, therefore, the assumption of proportional odds is met (*i.e.*, this assumption is valid).
- By not violating this assumption, one can treat each independent variable as having the same effect for each cumulative logit.
- To report this result:

The assumption of proportional odds was met, as assessed by a full likelihood ratio test comparing the residual of the fitted location model to a model with varying location parameters, $\chi^2(9) = 9.192$, $p = .420$.

Model fit

1. Overall goodness-of-fit tests

SPSS generates two tests of the overall goodness-of-fit of the model (*i.e.*, an overall measure of whether the model fits the data well). These are the Pearson and Deviance goodness-of-fit tests, as shown below in the **Goodness-of-Fit** table:

Goodness-of-Fit			
	Chi-Square	df	Sig.
Pearson	8.361	9	.498
Deviance	9.449	9	.397

Link function: Logit.

- Both the Pearson (the "**Pearson Chi-Square**" row) and deviance (the "**Deviance**" row) statistics are designed to provide a measure of how poorly the model fits the data (or the variations in the model that cannot be explained).
- Because the test statistics measure how poor the model is, one is actually looking for these tests to be not statistically significant to indicate a good model fit (*i.e.*, $p > .05$ in the "**Sig.**" column).
- Based on the analysis above, to report the result:
 - a) *The Pearson goodness-of-fit test indicated that the model was a good fit to the observed data, $\chi^2(9) = 8.361$, $p = .498$, (*i.e.*, $p > .05$)*
 - b) *The deviance goodness-of-fit test also indicated that the model was a good fit to the observed data, $\chi^2(9) = 9.449$, $p = .397$, (*i.e.*, $p > .05$)*

2. Likelihood-ratio test

A better method of assessing model fit is to look at the difference in model fit (in the PLUM analysis) when comparing the full model to the intercept-only model.

- The likelihood-ratio test is presented in the **Model Fitting Information** table, as shown below:

Model Fitting Information				
Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	43.210			
Final	41.867	1.344	3	.719

Link function: Logit.

- The model fit (the **"-2 Log Likelihood"** column) is 43.210 for the intercept-only model (the **"Intercept Only"** row) compared to the model with the intercept and all independent variables (the **"Final"** row), which has a -2 log likelihood of 41.867.
- The smaller the -2 log likelihood value, the better the fit. As such, the greater the difference between the two models, the better the independent variable is at explaining the dependent variable.
- The difference between the two -2 log likelihood values is presented in the **"Chi-Square"** column with 3 degrees of freedom (**"df"**) and the statistical significance level (*p*-value) of this test can be found in the **"Sig."** column.
- If the significance value was less than .05 (*i.e.*, $p < .05$), the independent variables would add to the prediction of the dependent variable. Since the significance value was greater than .05 (*i.e.*, $p > .05$), the independent variable does not add to the prediction of the dependent variable.
- In this analysis, the result can be stated as:

*According to the Model Fitting Information table obtained from PLUM analysis, the independent variable does not add to the prediction of the dependent variable, $\chi^2(3) = 1.344$, $p = .719$, (*i.e.*, $p > .05$).*

GENLIN parameter estimates: Tests of Model Effects (Polytomous variables)

The GENLIN procedure reports an overall test of significance for each variable entered into the logistic regression model in the **Tests of Model Effects** table given below:

Tests of Model Effects			
Source	Type III		
	Wald Chi-Square	df	Sig.
org_type	1.326	3	.723

Dependent Variable: Q1 - HRIS-Transactional (Day2Day)
Model: (Threshold), org_type

- The table above shows the omnibus test result for the org_type variable using the Wald test statistic.
- The hypothesis test value is presented in the **"Wald Chi-Square"** column with 3 degrees of freedom (**"df"**) and the statistical significance level (*p*-value) of this test can be found in the **"Sig."** column.
- If the significance value was less than .05 (*i.e.*, $p < .05$), the independent variable would add to the prediction of the dependent variable. Since the significance value was greater than .05 (*i.e.*, $p > .05$), the independent variable does not add to the prediction of the dependent variable.

- Therefore, the result can be stated as:

The above table clearly states that the independent variable has no significant effect on the dependent variable, Wald $\chi^2 (3) = 1.326, p = .723$ (i.e., $p > .05$).

The result: Multicollinearity: **No**; Proportional odds: **Yes**, $\chi^2 (9) = 12.023, p = .212$ (i.e., $p > 0.05$); Pearson goodness-of-fit: **Yes**, $\chi^2 (9) = 8.361, p = .498$ (i.e., $p > .05$); Deviance goodness-of-fit: **Yes**, $\chi^2 (9) = 9.449, p = .397$ (i.e., $p > .05$); Likelihood-ratio test: **No**, $\chi^2 (3) = 1.344, p = .719$ (i.e., $p > .05$); Model Effects: **No**, Wald $\chi^2 (3) = 1.326, p = .723$ (i.e., $p > .05$).

Discussion: Therefore, based on the analysis above, the conclusion here is that despite the fact that the model pass the multicollinearity test and meets the proportional odds and goodness of fit requirements, the two decisive factors of this analysis, the likelihood-ratio test and the tests of model effects suggest that the organization type **has no statistically significant effect** on HRIS-enabled day-to-day HR transactional record keeping practices such as, entering payroll information, employee status changes, *etc.*

Analysis 2: A cumulative odds ordinal logistic regression with proportional odds was run to determine the effect of organization type on the belief that Organization type significantly influences the Human Resources Information System (HRIS)-enabled HR transactional benefit administration practices, such as overseeing the health insurance coverage, administering investment and retirement program, *etc.*

The results were analysed under three categories, namely test for multicollinearity, proportional odds (PLUM), model fit (PLUM and GENLIN) and test of model effects (GENLIN).

Test for multicollinearity:

Coefficients ^a			
Model		Collinearity Statistics	
		Tolerance	VIF
1	Private	.442	2.263
	Government	.509	1.964
	Semi_Government	.565	1.770

a. Dependent Variable: Q2 - HRIS-Transactional (Benefit Admin)

Since all the Tolerance values are greater than 0.1 (the lowest is 0.442) and VIF values are much less than 10, therefore, **there is no problem with collinearity** in this particular data set.

Proportional Odds

The assumption of proportional odds is fundamental to the particular type of (cumulative) ordinal logistic regression model. This assumption means that each independent variable has an identical effect at each cumulative split of the ordinal dependent variable.

- This assumption can be tested formally using the statistical test that is generated when the test of parallel lines option in the **Ordinal Regression: Output** dialogue box is selected and the **Test of Parallel Lines** table is presented.

Test of Parallel Lines ^a				
Model	-2 Log Likelihood	Chi-Square	df	Sig.
Null Hypothesis	47.217			
General	39.339	7.878	9	.546

The null hypothesis states that the location parameters (slope coefficients) are the same across response categories.

a. Link function: Logit.

- This test works by comparing the model fit (the "**-2 Log Likelihood**" column) to the two different cumulative odds models.
- The two models that are compared are the proportional odds model (the "**Null Hypothesis**" row) and the cumulative odds model *without* the proportional odds constraint/assumption (the "**General**" row); *i.e.*, a model where the slope coefficients (relationship) are allowed to be different for each cumulative logit.
- If the assumption of proportional odds is met, one would expect the difference in model fit (the "**Chi-square**" column) between these two models to be small and not statistically significant ($p > .05$).
- Alternatively, if the assumption of proportional odds is violated, one would expect the difference in fit between these two models to be large and statistically significant ($p < .05$).
- The statistical significance level (p -value) of this test can be found in the "**Sig.**" column.
- In this analysis, $p = .546$, which is greater than .05 and, therefore, the assumption of proportional odds is met (*i.e.*, this assumption is valid).
- By not violating this assumption, one can treat each independent variable as having the same effect for each cumulative logit.
- To report this result:

The assumption of proportional odds was met, as assessed by a full likelihood ratio test comparing the residual of the fitted location model to a model with varying location parameters, $\chi^2(9) = 7.878, p = .546$.

Model fit

1. Overall goodness-of-fit tests

SPSS generates two tests of the overall goodness-of-fit of the model (*i.e.*, an overall measure of whether the model fits the data well). These are the Pearson and Deviance goodness-of-fit tests, as shown below in the **Goodness-of-Fit** table:

Goodness-of-Fit			
	Chi-Square	df	Sig.
Pearson	7.393	9	.596
Deviance	7.878	9	.546

Link function: Logit.

- Both the Pearson (the "**Pearson Chi-Square**" row) and deviance (the "**Deviance**" row) statistics are designed to provide a measure of how poorly the model fits the data (or the variations in the model that cannot be explained).
- Because the test statistics measure how poor the model is, one is actually looking for these tests to be not statistically significant to indicate a good model fit (*i.e.*, $p > .05$ in the "**Sig.**" column).
- Based on the analysis above, to report the result:
 - c) *The Pearson goodness-of-fit test indicated that the model was a good fit to the observed data, $\chi^2(9) = 7.393, p = .596$, (*i.e.*, $p > .05$)*
 - d) *The deviance goodness-of-fit test also indicated that the model was a good fit to the observed data, $\chi^2(9) = 7.878, p = .546$, (*i.e.*, $p > .05$)*

2. Likelihood-ratio test

A better method of assessing model fit is to look at the difference in model fit (in the PLUM analysis) when comparing the full model to the intercept-only model.

- The likelihood-ratio test is presented in the **Model Fitting Information** table, as shown below:

Model Fitting Information				
Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	53.384			
Final	47.217	6.167	3	.104

Link function: Logit.

- The model fit (the **"-2 Log Likelihood"** column) is 53.384 for the intercept-only model (the **"Intercept Only"** row) compared to the model with the intercept and all independent variables (the **"Final"** row), which has a -2 log likelihood of 47.217.
- The smaller the -2 log likelihood value, the better the fit. As such, the greater the difference between the two models, the better the independent variable is at explaining the dependent variable.
- The difference between the two -2 log likelihood values is presented in the **"Chi-Square"** column with 3 degrees of freedom (**"df"**) and the statistical significance level (*p*-value) of this test can be found in the **"Sig."** column.
- If the significance value was less than .05 (*i.e.*, $p < .05$), the independent variables would add to the prediction of the dependent variable. Since the significance value was greater than .05 (*i.e.*, $p > .05$), the independent variable does not add to the prediction of the dependent variable.
- In this analysis, the result can be stated as:

*According to the Model Fitting Information table obtained from PLUM analysis, the independent variable does not add to the prediction of the dependent variable, $\chi^2(3) = 6.167, p = .104$, (*i.e.*, $p > .05$).*

GENLIN parameter estimates: Tests of Model Effects (Polytomous variables)

The GENLIN procedure reports an overall test of significance for each variable entered into the logistic regression model in the **Tests of Model Effects** table given below:

Tests of Model Effects			
Source	Type III		
	Wald Chi-Square	df	Sig.
org_type	6.127	3	.106

Dependent Variable: Q2 - HRIS-Transactional
(Benefit Admin)
Model: (Threshold), org_type

- The table above shows the omnibus test result for the org_type variable using the Wald test statistic.
- The hypothesis test value is presented in the **"Wald Chi-Square"** column with 3 degrees of freedom (**"df"**) and the statistical significance level (*p*-value) of this test can be found in the **"Sig."** column.
- If the significance value was less than .05 (*i.e.*, $p < .05$), the independent variable would add to the prediction of the dependent variable. Since the significance value was greater

than .05 (i.e., $p > .05$), the independent variable does not add to the prediction of the dependent variable.

- Therefore, the result can be stated as:

The above table clearly states that the independent variable has no significant effect on the dependent variable, Wald $\chi^2(3) = 6.127, p = .106$ (i.e., $p > .05$).

The result: Multicollinearity: **No**; Proportional odds: **Yes**, $\chi^2(9) = 7.878, p = .546$ (i.e., $p > 0.05$); Pearson goodness-of-fit: **Yes**, $\chi^2(9) = 7.393, p = .596$ (i.e., $p > .05$); Deviance goodness-of-fit: **Yes**, $\chi^2(9) = 7.878, p = .546$ (i.e., $p > .05$); Likelihood-ratio test: **No**, $\chi^2(3) = 6.167, p = .104$ (i.e., $p > .05$); Model Effects: **No**, Wald $\chi^2(3) = 6.127, p = .106$ (i.e., $p > .05$).

Discussion: Therefore, based on the analysis above, the conclusion here is that despite the fact that the model pass the multicollinearity test and meets the proportional odds and goodness of fit requirements, the two decisive factors of this analysis, the likelihood-ratio test and the tests of model effects suggest that the organization type **has no statistically significant effect** on HRIS-enabled HR transactional employee benefits administration practices such as overseeing the health insurance coverage, administering investment and retirement program, etc.

Analysis 3: A cumulative odds ordinal logistic regression with proportional odds was run to determine the effect of organization type on the belief that organization type significantly influences the human resources information system (HRIS)-enabled human resources (HR) traditional management practices such as, employee recruitment, selection, training, promotion and compensation.

The results were analysed under three categories, namely test for multicollinearity, proportional odds (PLUM), model fit (PLUM and GENLIN) and test of model effects (GENLIN).

Test for multicollinearity:

Coefficients^a

Model		Collinearity Statistics	
		Tolerance	VIF
1	Private	.442	2.263
	Government	.509	1.964
	Semi_Government	.565	1.770

a. Dependent Variable: Q3 - HRIS-Traditional
(Rec.Select.Train.Promo.Comp.etc.)

Since all the Tolerance values are greater than 0.1 (the lowest is 0.442) and VIF values are much less than 10, therefore, **there is no problem with collinearity** in this particular data set.

Proportional Odds

The assumption of proportional odds is fundamental to the particular type of (cumulative) ordinal logistic regression model. This assumption means that each independent variable has an identical effect at each cumulative split of the ordinal dependent variable.

- This assumption can be tested formally using the statistical test that is generated when the test of parallel lines option in the **Ordinal Regression: Output** dialogue box is selected and the **Test of Parallel Lines** table is presented.

Test of Parallel Lines ^a				
Model	-2 Log Likelihood	Chi-Square	df	Sig.
Null Hypothesis	47.089			
General	39.655	7.435	9	.592

The null hypothesis states that the location parameters (slope coefficients) are the same across response categories.

a. Link function: Logit.

- This test works by comparing the model fit (the **"-2 Log Likelihood"** column) to the two different cumulative odds models.
- The two models that are compared are the proportional odds model (the **"Null Hypothesis"** row) and the cumulative odds model *without* the proportional odds constraint/assumption (the **"General"** row); *i.e.*, a model where the slope coefficients (relationship) are allowed to be different for each cumulative logit.
- If the assumption of proportional odds is met, one would expect the difference in model fit (the **"Chi-square"** column) between these two models to be small and not statistically significant ($p > .05$).
- Alternatively, if the assumption of proportional odds is violated, one would expect the difference in fit between these two models to be large and statistically significant ($p < .05$).
- The statistical significance level (p -value) of this test can be found in the **"Sig."** column.
- In this analysis, $p = .592$, which is greater than .05 and, therefore, the assumption of proportional odds is met (*i.e.*, this assumption is valid).
- By not violating this assumption, one can treat each independent variable as having the same effect for each cumulative logit.
- To report this result:

The assumption of proportional odds was met, as assessed by a full likelihood ratio test comparing the residual of the fitted location model to a model with varying location parameters, $\chi^2(9) = 7.435$, $p = .592$.

Model fit

1. Overall goodness-of-fit tests

SPSS generates two tests of the overall goodness-of-fit of the model (*i.e.*, an overall measure of whether the model fits the data well). These are the Pearson and Deviance goodness-of-fit tests, as shown below in the **Goodness-of-Fit** table:

Goodness-of-Fit			
	Chi-Square	df	Sig.
Pearson	6.814	9	.656
Deviance	7.435	9	.592

Link function: Logit.

- Both the Pearson (the "**Pearson Chi-Square**" row) and deviance (the "**Deviance**" row) statistics are designed to provide a measure of how poorly the model fits the data (or the variations in the model that cannot be explained).
- Because the test statistics measure how poor the model is, one is actually looking for these tests to be not statistically significant to indicate a good model fit (*i.e.*, $p > .05$ in the "**Sig.**" column).
- Based on the analysis above, to report the result:
 - e) *The Pearson goodness-of-fit test indicated that the model was a good fit to the observed data, $\chi^2(9) = 6.814$, $p = .656$, (*i.e.*, $p > .05$)*
 - f) *The deviance goodness-of-fit test also indicated that the model was a good fit to the observed data, $\chi^2(9) = 7.435$, $p = .592$, (*i.e.*, $p > .05$)*

2. Likelihood-ratio test

A better method of assessing model fit is to look at the difference in model fit (in the PLUM analysis) when comparing the full model to the intercept-only model.

- The likelihood-ratio test is presented in the **Model Fitting Information** table, as shown below:

Model Fitting Information				
Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	51.555			
Final	47.089	4.466	3	.215

Link function: Logit.

- The model fit (the **"-2 Log Likelihood"** column) is 51.555 for the intercept-only model (the **"Intercept Only"** row) compared to the model with the intercept and all independent variables (the **"Final"** row), which has a -2 log likelihood of 47.089.
- The smaller the -2 log likelihood value, the better the fit. As such, the greater the difference between the two models, the better the independent variable is at explaining the dependent variable.
- The difference between the two -2 log likelihood values is presented in the **"Chi-Square"** column with 3 degrees of freedom (**"df"**) and the statistical significance level (*p*-value) of this test can be found in the **"Sig."** column.
- If the significance value was less than .05 (*i.e.*, $p < .05$), the independent variables would add to the prediction of the dependent variable. Since the significance value was greater than .05 (*i.e.*, $p > .05$), the independent variable does not add to the prediction of the dependent variable.
- In this analysis, the result can be stated as:

*According to the Model Fitting Information table obtained from PLUM analysis, the independent variable does not add to the prediction of the dependent variable, $\chi^2(3) = 4.466$, $p = .215$, (*i.e.*, $p > .05$).*

GENLIN parameter estimates: Tests of Model Effects (Polytomous variables)

The GENLIN procedure reports an overall test of significance for each variable entered into the logistic regression model in the **Tests of Model Effects** table given below:

Tests of Model Effects			
Source	Type III		
	Wald Chi-Square	df	Sig.
org_type	4.607	3	.203

Dependent Variable: Q3 - HRIS-Traditional (Rec. Select.Train.Promo.Comp.etc.)
Model: (Threshold), org_type

- The table above shows the omnibus test result for the org_type variable using the Wald test statistic.
- The hypothesis test value is presented in the **"Wald Chi-Square"** column with 3 degrees of freedom (**"df"**) and the statistical significance level (*p*-value) of this test can be found in the **"Sig."** column.
- If the significance value was less than .05 (*i.e.*, $p < .05$), the independent variable would add to the prediction of the dependent variable. Since the significance value was greater than .05 (*i.e.*, $p > .05$), the independent variable does not add to the prediction of the dependent variable.

- Therefore, the result can be stated as:

The above table clearly states that the independent variable has no significant effect on the dependent variable, Wald $\chi^2 (3) = 4.607, p = .203$ (i.e., $p > .05$).

The result: Multicollinearity: **No**; Proportional odds: **Yes**, $\chi^2 (9) = 7.435, p = .592$ ($p > 0.05$); Pearson goodness-of-fit: **Yes**, $\chi^2 (9) = 6.814, p = .656$ (i.e., $p > .05$); Deviance goodness-of-fit: **Yes**, $\chi^2 (9) = 7.435, p = .592$ (i.e., $p > .05$); Likelihood-ratio test: **No**, $\chi^2 (3) = 4.466, p = .215$ (i.e. $p > .05$); Model Effects: **No**, Wald $\chi^2 (3) = 4.607, p = .203$ (i.e., $p > .05$).

Discussion: Therefore, based on the analysis above, the conclusion here is that despite the fact that the model pass the multicollinearity test and meets the proportional odds and goodness of fit requirements, the two decisive factors of this analysis, the likelihood-ratio test and the tests of model effects suggest that the organization type **has no statistically significant effect** on HRIS-enabled HR traditional management practices related to employee recruitment, selection, training, promotion, and compensation.

Analysis 4: A cumulative odds ordinal logistic regression with proportional odds was run to determine the effect of organization type on the belief that organization type significantly influences the human resources information system (HRIS)-enabled human resources (HR) traditional management practices such as, employee performance management, rewards, career development and communication (employee relations).

The results were analysed under three categories, namely test for multicollinearity, proportional odds (PLUM), model fit (PLUM and GENLIN) and test of model effects (GENLIN).

Test for multicollinearity:

Coefficients^a

Model		Collinearity Statistics	
		Tolerance	VIF
1	Private	.442	2.263
	Government	.509	1.964
	Semi_Government	.565	1.770

a. Dependent Variable: Q4 - HRIS-Traditional
(Peform_Mgmt.Reward.Career_Dev.etc.)

Since all the Tolerance values are greater than 0.1 (the lowest is 0.442) and VIF values are much less than 10, therefore, **there is no problem with collinearity** in this particular data set.

Proportional Odds

The assumption of proportional odds is fundamental to the particular type of (cumulative) ordinal logistic regression model. This assumption means that each independent variable has an identical effect at each cumulative split of the ordinal dependent variable.

- This assumption can be tested formally using the statistical test that is generated when the test of parallel lines option in the **Ordinal Regression: Output** dialogue box is selected and the **Test of Parallel Lines** table is presented.

Test of Parallel Lines^a

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Null Hypothesis	52.078			
General	37.525	14.553	9	.104

The null hypothesis states that the location parameters (slope coefficients) are the same across response categories.

a. Link function: Logit.

- This test works by comparing the model fit (the "**-2 Log Likelihood**" column) to the two different cumulative odds models.
- The two models that are compared are the proportional odds model (the "**Null Hypothesis**" row) and the cumulative odds model *without* the proportional odds constraint/assumption (the "**General**" row); *i.e.*, a model where the slope coefficients (relationship) are allowed to be different for each cumulative logit.
- If the assumption of proportional odds is met, one would expect the difference in model fit (the "**Chi-square**" column) between these two models to be small and not statistically significant ($p > .05$).
- Alternatively, if the assumption of proportional odds is violated, one would expect the difference in fit between these two models to be large and statistically significant ($p < .05$).
- The statistical significance level (p -value) of this test can be found in the "**Sig.**" column.
- In this analysis, $p = .104$, which is greater than .05 and, therefore, the assumption of proportional odds is met (*i.e.*, this assumption is valid).
- By not violating this assumption, one can treat each independent variable as having the same effect for each cumulative logit.
- To report this result:

The assumption of proportional odds was met, as assessed by a full likelihood ratio test comparing the residual of the fitted location model to a model with varying location parameters, $\chi^2(9) = 14.553$, $p = .104$.

Model fit

1. Overall goodness-of-fit tests

SPSS generates two tests of the overall goodness-of-fit of the model (*i.e.*, an overall measure of whether the model fits the data well). These are the Pearson and Deviance goodness-of-fit tests, as shown below in the **Goodness-of-Fit** table:

Goodness-of-Fit			
	Chi-Square	df	Sig.
Pearson	13.129	9	.157
Deviance	14.553	9	.104

Link function: Logit.

- Both the Pearson (the "**Pearson Chi-Square**" row) and deviance (the "**Deviance**" row) statistics are designed to provide a measure of how poorly the model fits the data (or the variations in the model that cannot be explained).
- Because the test statistics measure how poor the model is, one is actually looking for these tests to be not statistically significant to indicate a good model fit (*i.e.*, $p > .05$ in the "**Sig.**" column).
- Based on the analysis above, to report the result:
 - g) The Pearson goodness-of-fit test indicated that the model was a good fit to the observed data, $\chi^2(9) = 13.129$, $p = .157$, (*i.e.*, $p > .05$)*
 - h) The deviance goodness-of-fit test also indicated that the model was a good fit to the observed data, $\chi^2(9) = 14.553$, $p = .104$, (*i.e.*, $p > .05$)*

2. Likelihood-ratio test

A better method of assessing model fit is to look at the difference in model fit (in the PLUM analysis) when comparing the full model to the intercept-only model.

- The likelihood-ratio test is presented in the **Model Fitting Information** table, as shown below:

Model Fitting Information

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	57.153			
Final	52.078	5.075	3	.166

Link function: Logit.

- The model fit (the "**-2 Log Likelihood**" column) is 57.153 for the intercept-only model (the "**Intercept Only**" row) compared to the model with the intercept and all independent variables (the "**Final**" row), which has a -2 log likelihood of 52.078.
- The smaller the -2 log likelihood value, the better the fit. As such, the greater the difference between the two models, the better the independent variable is at explaining the dependent variable.
- The difference between the two -2 log likelihood values is presented in the "**Chi-Square**" column with 3 degrees of freedom ("**df**") and the statistical significance level (*p*-value) of this test can be found in the "**Sig.**" column.
- If the significance value was less than .05 (*i.e.*, $p < .05$), the independent variables would add to the prediction of the dependent variable. Since the significance value was greater than .05 (*i.e.*, $p > .05$), the independent variable does not add to the prediction of the dependent variable.
- In this analysis, the result can be stated as:

*According to the Model Fitting Information table obtained from PLUM analysis, the independent variable does not add to the prediction of the dependent variable, $\chi^2(3) = 5.075$, $p = .166$, (*i.e.*, $p > .05$).*

GENLIN parameter estimates: Tests of Model Effects (Polytomous variables)

The GENLIN procedure reports an overall test of significance for each variable entered into the logistic regression model in the **Tests of Model Effects** table given below:

Tests of Model Effects

Source	Type III		
	Wald Chi-Square	df	Sig.
org_type	5.079	3	.166

Dependent Variable: Q4 - HRIS-Traditional
(Perform_Mgmt.Reward.Career_Dev.etc.)
Model: (Threshold), org_type

- The table above shows the omnibus test result for the org_type variable using the Wald test statistic.

- The hypothesis test value is presented in the "**Wald Chi-Square**" column with 3 degrees of freedom ("**df**") and the statistical significance level (*p*-value) of this test can be found in the "**Sig.**" column.
- If the significance value was less than .05 (*i.e.*, $p < .05$), the independent variable would add to the prediction of the dependent variable. Since the significance value was greater than .05 (*i.e.*, $p > .05$), the independent variable does not add to the prediction of the dependent variable.
- Therefore, the result can be stated as:

*The above table clearly states that the independent variable has no significant effect on the dependent variable, Wald $\chi^2 (3) = 5.079, p = .166$ (*i.e.*, $p > .05$).*

The result: Multicollinearity: **No**; Proportional odds: **Yes**, $\chi^2 (9) = 14.553, p = .104$ ($p > 0.05$); Pearson goodness-of-fit: **Yes**, $\chi^2 (9) = 13.129, p = .157$ (*i.e.*, $p > .05$); Deviance goodness-of-fit: **Yes**, $\chi^2 (9) = 14.553, p = .104$ (*i.e.*, $p > .05$); Likelihood-ratio test: **No**, $\chi^2 (3) = 5.075, p = .166$ (*i.e.*, $p > .05$); Model Effects: **No**, Wald $\chi^2 (3) = 5.079, p = .166$ (*i.e.*, $p > .05$).

Discussion: Therefore, based on the analysis above, the conclusion here is that despite the fact that the model pass the multicollinearity test and meets the proportional odds and goodness of fit requirements, the two decisive factors of this analysis, the likelihood-ratio test and the tests of model effects suggest that the organization type **has no statistically significant effect** on HRIS-enabled HR traditional management practices related to employee performance management, rewards, career development and communication (employee relations).

Analysis 5: A cumulative odds ordinal logistic regression with proportional odds was run to determine the effect of organization type on the belief that organization type significantly impacts the human resources information system (HRIS)-enabled human resources (HR) transformational strategic organizational practices such as, strategic planning, organizational development, knowledge management and change management.

The results were analysed under three categories, namely test for multicollinearity, proportional odds (PLUM), model fit (PLUM and GENLIN) and test of model effects (GENLIN).

Test for multicollinearity:

Coefficients ^a			
Model		Collinearity Statistics	
		Tolerance	VIF
1	Private	.442	2.263
	Government	.509	1.964
	Semi_Government	.565	1.770

a. Dependent Variable: Q5 - HRIS-Transformational (Strategic_Plan.Org_Dev.Know_Mgmt.Change_Mgmt.)

Since all the Tolerance values are greater than 0.1 (the lowest is 0.442) and VIF values are much less than 10, therefore, **there is no problem with collinearity** in this particular data set.

Proportional Odds

The assumption of proportional odds is fundamental to the particular type of (cumulative) ordinal logistic regression model. This assumption means that each independent variable has an identical effect at each cumulative split of the ordinal dependent variable.

- This assumption can be tested formally using the statistical test that is generated when the test of parallel lines option in the **Ordinal Regression: Output** dialogue box is selected and the **Test of Parallel Lines** table is presented.

Test of Parallel Lines ^a				
Model	-2 Log Likelihood	Chi-Square	df	Sig.
Null Hypothesis	46.054			
General	40.936	5.117	9	.824

The null hypothesis states that the location parameters (slope coefficients) are the same across response categories.

a. Link function: Logit.

- This test works by comparing the model fit (the **"-2 Log Likelihood"** column) to the two different cumulative odds models.
- The two models that are compared are the proportional odds model (the **"Null Hypothesis"** row) and the cumulative odds model *without* the proportional odds constraint/assumption (the **"General"** row); *i.e.*, a model where the slope coefficients (relationship) are allowed to be different for each cumulative logit.
- If the assumption of proportional odds is met, one would expect the difference in model fit (the **"Chi-square"** column) between these two models to be small and not statistically significant ($p > .05$).

- Alternatively, if the assumption of proportional odds is violated, one would expect the difference in fit between these two models to be large and statistically significant ($p < .05$).
- The statistical significance level (p -value) of this test can be found in the "**Sig.**" column.
- In this analysis, $p = .824$, which is greater than .05 and, therefore, the assumption of proportional odds is met (*i.e.*, this assumption is valid).
- By not violating this assumption, one can treat each independent variable as having the same effect for each cumulative logit.
- To report this result:

The assumption of proportional odds was met, as assessed by a full likelihood ratio test comparing the residual of the fitted location model to a model with varying location parameters, $\chi^2 (9) = 5.117$, $p = .824$.

Model fit

1. Overall goodness-of-fit tests

SPSS generates two tests of the overall goodness-of-fit of the model (*i.e.*, an overall measure of whether the model fits the data well). These are the Pearson and Deviance goodness-of-fit tests, as shown below in the **Goodness-of-Fit** table:

Goodness-of-Fit			
	Chi-Square	df	Sig.
Pearson	4.069	9	.907
Deviance	5.117	9	.824

Link function: Logit.

- Both the Pearson (the "**Pearson Chi-Square**" row) and deviance (the "**Deviance**" row) statistics are designed to provide a measure of how poorly the model fits the data (or the variations in the model that cannot be explained).
- Because the test statistics measure how poor the model is, one is actually looking for these tests to be not statistically significant to indicate a good model fit (*i.e.*, $p > .05$ in the "**Sig.**" column).
- Based on the analysis above, to report the result:
 - The Pearson goodness-of-fit test indicated that the model was a good fit to the observed data, $\chi^2 (9) = 4.069$, $p = .907$, (*i.e.*, $p > .05$)*
 - The deviance goodness-of-fit test also indicated that the model was a good fit to the observed data, $\chi^2 (9) = 5.117$, $p = .824$, (*i.e.*, $p > .05$)*

2. Likelihood-ratio test

A better method of assessing model fit is to look at the difference in model fit (in the PLUM analysis) when comparing the full model to the intercept-only model.

- The likelihood-ratio test is presented in the **Model Fitting Information** table, as shown below:

Model Fitting Information				
Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	48.141			
Final	46.054	2.087	3	.555

Link function: Logit.

- The model fit (the "**-2 Log Likelihood**" column) is 48.141 for the intercept-only model (the "**Intercept Only**" row) compared to the model with the intercept and all independent variables (the "**Final**" row), which has a -2 log likelihood of 46.054.
- The smaller the -2 log likelihood value, the better the fit. As such, the greater the difference between the two models, the better the independent variable is at explaining the dependent variable.
- The difference between the two -2 log likelihood values is presented in the "**Chi-Square**" column with 3 degrees of freedom ("**df**") and the statistical significance level (*p*-value) of this test can be found in the "**Sig.**" column.
- If the significance value was less than .05 (*i.e.*, $p < .05$), the independent variables would add to the prediction of the dependent variable. Since the significance value was greater than .05 (*i.e.*, $p > .05$), the independent variable does not add to the prediction of the dependent variable.
- In this analysis, the result can be stated as:

*According to the Model Fitting Information table obtained from PLUM analysis, the independent variable does not add to the prediction of the dependent variable, $\chi^2(3) = 2.087$, $p = .555$, (*i.e.*, $p > .05$).*

GENLIN parameter estimates: Tests of Model Effects (Polytomous variables)

The GENLIN procedure reports an overall test of significance for each variable entered into the logistic regression model in the **Tests of Model Effects** table given below:

Tests of Model Effects

Source	Type III		
	Wald Chi-Square	df	Sig.
org_type	1.972	3	.578

Dependent Variable: Q5 - HRIS-Transformational
(Strategic_Plan.Org_Dev.Know_Mgmt.
Change_Mgmt.)

Model: (Threshold), org_type

- The table above shows the omnibus test result for the org_type variable using the Wald test statistic.
- The hypothesis test value is presented in the "**Wald Chi-Square**" column with 3 degrees of freedom ("**df**") and the statistical significance level (*p*-value) of this test can be found in the "**Sig.**" column.
- If the significance value was less than .05 (*i.e.*, $p < .05$), the independent variable would add to the prediction of the dependent variable. Since the significance value was greater than .05 (*i.e.*, $p > .05$), the independent variable does not add to the prediction of the dependent variable.
- Therefore, the result can be stated as:

*The above table clearly states that the independent variable has no significant effect on the dependent variable, Wald $\chi^2(3) = 1.972$, $p = .578$ (*i.e.*, $p > .05$).*

The result: Multicollinearity: **No**; Proportional odds: **Yes**, $\chi^2(9) = 5.117$, $p = .824$ ($p > 0.05$); Pearson goodness-of-fit: **Yes**, $\chi^2(9) = 4.069$, $p = .907$ (*i.e.*, $p > .05$); Deviance goodness-of-fit: **Yes**, $\chi^2(9) = 5.117$, $p = .824$ (*i.e.*, $p > .05$); Likelihood-ratio test: **No**, $\chi^2(3) = 2.087$, $p = .555$ (*i.e.* $p > .05$); Model Effects: **No**, Wald $\chi^2(3) = 1.972$, $p = .578$ (*i.e.*, $p > .05$).

Discussion: Therefore, based on the analysis above, the conclusion here is that despite the fact that the model pass the multicollinearity test and meets the proportional odds and goodness of fit requirements, the two decisive factors of this analysis, the likelihood-ratio test and the tests of model effects suggest that the organization type **has no statistically significant effect** on HRIS-enabled HR transformational management practices that meet strategic organizational objectives such as strategic planning, organizational development, knowledge management and change management.

Table 10.2 - Results: Impact of organization type on HRIS-enabled HR practices

Analysis	Multicollinearity	Proportional Odds			Goodness-of-fit tests						Likelihood-ratio			Tests of Model Effects		
					Pearson			Deviance								
		Chi-Square (χ^2)	<i>P</i> - value	Met?	Chi-Square (χ^2)	<i>P</i> - value	Fit?	Chi-Square (χ^2)	<i>P</i> - value	Fit?	Chi-Square (χ^2)	<i>P</i> - value	Sig. Effect?	Wald Chi-Square (χ^2)	<i>P</i> - value	Sig. Effect?
1	No	12.023	.212	Yes <i>P</i> >.05	8.361	.498	Yes <i>P</i> >.05	9.449	.397	Yes <i>P</i> >.05	1.344	.719	No <i>P</i> >.05	1.326	.723	No <i>P</i> >.05
2	No	7.878	.546	Yes <i>P</i> >.05	7.393	.596	Yes <i>P</i> >.05	7.878	.546	Yes <i>P</i> >.05	6.167	.104	No <i>P</i> >.05	6.127	.106	No <i>P</i> >.05
3	No	7.435	.592	Yes <i>P</i> >.05	6.814	.656	Yes <i>P</i> >.05	7.435	.592	Yes <i>P</i> >.05	4.466	.215	No <i>P</i> >.05	4.607	.203	No <i>P</i> >.05
4	No	14.553	.104	Yes <i>P</i> >.05	13.129	.157	Yes <i>P</i> >.05	14.553	.104	Yes <i>P</i> >.05	5.075	.166	No <i>P</i> >.05	5.079	.166	No <i>P</i> >.05
5	No	5.117	.824	Yes <i>P</i> >.05	4.069	.907	Yes <i>P</i> >.05	5.117	.824	Yes <i>P</i> >.05	2.087	.555	No <i>P</i> >.05	1.972	.578	No <i>P</i> >.05

10.2.2 Section 2 - Organization type vs. HRIS-enabled HRM performance results and discussion

Table 10.3 depicts the summary of the ordinal regression analyses that the researcher carried out to determine if there is any impact of organization type on HRIS-enabled HR practices and HRM performance.

Analysis 6: A cumulative odds ordinal logistic regression with proportional odds was run to determine the effect of organization type on the belief that organization type significantly impacts HRIS-enabled day-to-day human resources (HR) transactional record keeping practices such as, entering payroll information, employee status changes, *etc.* and HRM performance related to employee satisfaction, motivation, presence (obverse of absenteeism) and retention (obverse of turnover).

The results were analysed under three categories, namely test for multicollinearity, proportional odds (PLUM), model fit (PLUM and GENLIN) and test of model effects (GENLIN).

Test for multicollinearity:

Coefficients ^a			
Model		Collinearity Statistics	
		Tolerance	VIF
1	Private	.442	2.263
	Government	.509	1.964
	Semi_Government	.565	1.770

a. Dependent Variable: Q6 - HR-enabled Transactional-HR Performance (Day2Day-Satis.Motivation.Presense.Retention)

Since all the Tolerance values are greater than 0.1 (the lowest is 0.442) and VIF values are much less than 10, therefore, **there is no problem with collinearity** in this particular data set.

Proportional Odds

The assumption of proportional odds is fundamental to the particular type of (cumulative) ordinal logistic regression model. This assumption means that each independent variable has an identical effect at each cumulative split of the ordinal dependent variable.

- This assumption can be tested formally using the statistical test that is generated when the test of parallel lines option in the **Ordinal Regression: Output** dialogue box is selected and the **Test of Parallel Lines** table is presented.

Test of Parallel Lines^a

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Null Hypothesis	48.697			
General	42.759	5.938	9	.746

The null hypothesis states that the location parameters (slope coefficients) are the same across response categories.

a. Link function: Logit.

- This test works by comparing the model fit (the "**-2 Log Likelihood**" column) to the two different cumulative odds models.
- The two models that are compared are the proportional odds model (the "**Null Hypothesis**" row) and the cumulative odds model *without* the proportional odds constraint/assumption (the "**General**" row); *i.e.*, a model where the slope coefficients (relationship) are allowed to be different for each cumulative logit.
- If the assumption of proportional odds is met, one would expect the difference in model fit (the "**Chi-square**" column) between these two models to be small and not statistically significant ($p > .05$).
- Alternatively, if the assumption of proportional odds is violated, one would expect the difference in fit between these two models to be large and statistically significant ($p < .05$).
- The statistical significance level (p -value) of this test can be found in the "**Sig.**" column.
- In this analysis, $p = .746$, which is greater than .05 and, therefore, the assumption of proportional odds is met (*i.e.*, this assumption is valid).
- By not violating this assumption, one can treat each independent variable as having the same effect for each cumulative logit.
- To report this result:

The assumption of proportional odds was met, as assessed by a full likelihood ratio test comparing the residual of the fitted location model to a model with varying location parameters, $\chi^2 (9) = 5.938, p = .746$.

Model fit

1. Overall goodness-of-fit tests

SPSS generates two tests of the overall goodness-of-fit of the model (*i.e.*, an overall measure of whether the model fits the data well). These are the Pearson and Deviance goodness-of-fit tests, as shown below in the **Goodness-of-Fit** table:

Goodness-of-Fit

	Chi-Square	df	Sig.
Pearson	4.640	9	.864
Deviance	5.938	9	.746

Link function: Logit.

- Both the Pearson (the "**Pearson Chi-Square**" row) and deviance (the "**Deviance**" row) statistics are designed to provide a measure of how poorly the model fits the data (or the variations in the model that cannot be explained).
- Because the test statistics measure how poor the model is, one is actually looking for these tests to be not statistically significant to indicate a good model fit (*i.e.*, $p > .05$ in the "**Sig.**" column).
- Based on the analysis above, to report the result:
 - *The Pearson goodness-of-fit test indicated that the model was **a good fit** to the observed data, $\chi^2(9) = 4.640, p = .864$ (*i.e.*, $p > .05$).*
 - *The Deviance goodness-of-fit test indicated that the model was **a good fit** to the observed data, $\chi^2(9) = 5.938, p = .746$ (*i.e.*, $p > .05$).*

2. Likelihood-ratio test

A better method of assessing model fit is to look at the difference in model fit (in the PLUM analysis) when comparing the full model to the intercept-only model.

- The likelihood-ratio test is presented in the **Model Fitting Information** table, as shown below:

Model Fitting Information

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	54.414			
Final	48.697	5.717	3	.126

Link function: Logit.

- The model fit (the "**-2 Log Likelihood**" column) is 54.414 for the intercept-only model (the "**Intercept Only**" row) compared to the model with the intercept and all independent variables (the "**Final**" row), which has a -2 log likelihood of 48.697.
- The smaller the -2 log likelihood value, the better the fit. As such, the greater the difference between the two models, the better the independent variable is at explaining the dependent variable.

- The difference between the two -2 log likelihood values is presented in the "**Chi-Square**" column with 3 degrees of freedom ("**df**") and the statistical significance level (*p*-value) of this test can be found in the "**Sig.**" column.
- If the significance value was less than .05 (*i.e.*, $p < .05$), the independent variables would add to the prediction of the dependent variable. Since the significance value was greater than .05 (*i.e.*, $p > .05$), the independent variable does not add to the prediction of the dependent variable.
- In this analysis, the result can be stated as:

*According to the Model Fitting Information table obtained from PLUM analysis, the independent variable does not add to the prediction of the dependent variable; $\chi^2(3) = 5.717$, $p = .126$, (*i.e.*, $p > .05$).*

GENLIN parameter estimates: Tests of Model Effects (Polytomous variables)

The GENLIN procedure reports an overall test of significance for each variable entered into the logistic regression model in the **Tests of Model Effects** table given below:

Tests of Model Effects			
Source	Type III		
	Wald Chi-Square	df	Sig.
org_type	5.482	3	.140

Dependent Variable: Q6 - HR-enabled Transactional-HR Performance (Day2Day-Satis. Motivation.Presense.Retention)
Model: (Threshold), org_type

- The table above shows the omnibus test result for the org_type variable using the Wald test statistic.
- The hypothesis test value is presented in the "**Wald Chi-Square**" column with 3 degrees of freedom ("**df**") and the statistical significance level (*p*-value) of this test can be found in the "**Sig.**" column.
- If the significance value was less than .05 (*i.e.*, $p < .05$), the independent variable would add to the prediction of the dependent variable. Since the significance value was greater than .05 (*i.e.*, $p > .05$), the independent variable does not add to the prediction of the dependent variable.
- Therefore, the result can be stated as:

*The above table clearly states that the independent variable has no significant effect on the dependent variable; Wald $\chi^2(3) = 5.482$, $p = .140$ (*i.e.*, $p > .05$).*

The result: Multicollinearity: **No**; Proportional odds: **Yes**, $\chi^2 (9) = 5.938, p = .746$ ($p > 0.05$); Pearson goodness-of-fit: **Yes**, $\chi^2 (9) = 4.640, p = .864$ (*i.e.*, $p > .05$); Deviance goodness-of-fit: **Yes**, $\chi^2 (9) = 5.938, p = .746$ (*i.e.*, $p > .05$); Likelihood-ratio test: **No**, $\chi^2 (3) = 5.717, p = .126$ (*i.e.* $p > .05$); Model Effects: **No**, Wald $\chi^2 (3) = 5.482, p = .140$ (*i.e.*, $p > .05$).

Discussion: Therefore, based on the analysis above, the conclusion here is that despite the fact that the model pass the multicollinearity test and meets the proportional odds and goodness of fit requirements, the two decisive factors of this analysis, the likelihood-ratio test and the tests of model effects suggest that the organization type **has no statistically significant effect** on HRIS-enabled day-to-day HR transactional record keeping practices such as, entering payroll information, employee status changes, *etc.* and HRM performance related to employee satisfaction, motivation, presence (obverse of absenteeism) and retention (obverse of turnover).

Analysis 7: A cumulative odds ordinal logistic regression with proportional odds was run to determine the effect of organization type on the belief that organization type significantly impacts HRIS-enabled day-to-day human resources (HR) transactional record keeping practices such as, entering payroll information, employee status changes, *etc.* and HRM performance related to involvement, trust, loyalty, commitment and “social climate” between workers and management.

The results were analysed under three categories, namely test for multicollinearity, proportional odds (PLUM), model fit (PLUM and GENLIN) and test of model effects (GENLIN).

Test for multicollinearity:

Coefficients ^a			
Model		Collinearity Statistics	
		Tolerance	VIF
1	Private	.442	2.263
	Government	.509	1.964
	Semi_Government	.565	1.770

a. Dependent Variable: Q7 - HR-enabled Transactional-HR Performance (Day2Day-Invole.Trust.Loyal.commit.)

Since all the Tolerance values are greater than 0.1 (the lowest is 0.442) and VIF values are much less than 10, therefore, **there is no problem with collinearity** in this particular data set.

Proportional Odds

The assumption of proportional odds is fundamental to the particular type of (cumulative) ordinal logistic regression model. This assumption means that each independent variable has an identical effect at each cumulative split of the ordinal dependent variable.

- This assumption can be tested formally using the statistical test that is generated when the test of parallel lines option in the **Ordinal Regression: Output** dialogue box is selected and the **Test of Parallel Lines** table is presented.

Test of Parallel Lines^a

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Null Hypothesis	50.343			
General	42.913	7.429	9	.593

The null hypothesis states that the location parameters (slope coefficients) are the same across response categories.

a. Link function: Logit.

- This test works by comparing the model fit (the "**-2 Log Likelihood**" column) to the two different cumulative odds models.
- The two models that are compared are the proportional odds model (the "**Null Hypothesis**" row) and the cumulative odds model *without* the proportional odds constraint/assumption (the "**General**" row); *i.e.*, a model where the slope coefficients (relationship) are allowed to be different for each cumulative logit.
- If the assumption of proportional odds is met, one would expect the difference in model fit (the "**Chi-square**" column) between these two models to be small and not statistically significant ($p > .05$).
- Alternatively, if the assumption of proportional odds is violated, one would expect the difference in fit between these two models to be large and statistically significant ($p < .05$).
- The statistical significance level (p -value) of this test can be found in the "**Sig.**" column.
- In this analysis, $p = .593$, which is greater than .05 and, therefore, the assumption of proportional odds is met (*i.e.*, this assumption is valid).
- By not violating this assumption, one can treat each independent variable as having the same effect for each cumulative logit.
- To report this result:

The assumption of proportional odds was met, as assessed by a full likelihood ratio test comparing the residual of the fitted location model to a model with varying location parameters, $\chi^2(9) = 7.429, p = .593$.

Model fit

1. Overall goodness-of-fit tests

SPSS generates two tests of the overall goodness-of-fit of the model (*i.e.*, an overall measure of whether the model fits the data well). These are the Pearson and Deviance goodness-of-fit tests, as shown below in the **Goodness-of-Fit** table:

Goodness-of-Fit			
	Chi-Square	df	Sig.
Pearson	5.903	9	.750
Deviance	7.429	9	.593

Link function: Logit.

- Both the Pearson (the "**Pearson Chi-Square**" row) and deviance (the "**Deviance**" row) statistics are designed to provide a measure of how poorly the model fits the data (or the variations in the model that cannot be explained).
- Because the test statistics measure how poor the model is, one is actually looking for these tests to be not statistically significant to indicate a good model fit (*i.e.*, $p > .05$ in the "**Sig.**" column).
- Based on the analysis above, to report the result:
 - *The Pearson goodness-of-fit test indicated that the model was **a good fit** to the observed data, $\chi^2(9) = 5.903, p = .750$ (*i.e.*, $p > .05$).*
 - *The Deviance goodness-of-fit test indicated that the model was **a good fit** to the observed data, $\chi^2(9) = 7.429, p = .593$ (*i.e.*, $p > .05$).*

2. Likelihood-ratio test

A better method of assessing model fit is to look at the difference in model fit (in the PLUM analysis) when comparing the full model to the intercept-only model.

- The likelihood-ratio test is presented in the **Model Fitting Information** table, as shown below:

Model Fitting Information

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	53.608			
Final	50.343	3.265	3	.353

Link function: Logit.

- The model fit (the "**-2 Log Likelihood**" column) is 53.608 for the intercept-only model (the "**Intercept Only**" row) compared to the model with the intercept and all independent variables (the "**Final**" row), which has a -2 log likelihood of 50.343.
- The smaller the -2 log likelihood value, the better the fit. As such, the greater the difference between the two models, the better the independent variable is at explaining the dependent variable.
- The difference between the two -2 log likelihood values is presented in the "**Chi-Square**" column with 3 degrees of freedom ("**df**") and the statistical significance level (*p*-value) of this test can be found in the "**Sig.**" column.
- If the significance value was less than .05 (*i.e.*, $p < .05$), the independent variables would add to the prediction of the dependent variable. Since the significance value was greater than .05 (*i.e.*, $p > .05$), the independent variable does not add to the prediction of the dependent variable.
- In this analysis, the result can be stated as:

*According to the Model Fitting Information table obtained from PLUM analysis, the independent variable does not add to the prediction of the dependent variable; $\chi^2(3) = 3.265$, $p = .353$, (*i.e.*, $p > .05$).*

GENLIN parameter estimates: Tests of Model Effects (Polytomous variables)

The GENLIN procedure reports an overall test of significance for each variable entered into the logistic regression model in the **Tests of Model Effects** table given below:

Tests of Model Effects

Source	Type III		
	Wald Chi-Square	df	Sig.
org_type	3.302	3	.347

Dependent Variable: Q7 - HR-enabled
Transactional-HR Performance (Day2Day-Invole.
Trust.Loyal.commit.)
Model: (Threshold), org_type

- The table above shows the omnibus test result for the org_type variable using the Wald test statistic.

- The hypothesis test value is presented in the "**Wald Chi-Square**" column with 3 degrees of freedom ("**df**") and the statistical significance level (*p*-value) of this test can be found in the "**Sig.**" column.
- If the significance value was less than .05 (*i.e.*, $p < .05$), the independent variable would add to the prediction of the dependent variable. Since the significance value was greater than .05 (*i.e.*, $p > .05$), the independent variable does not add to the prediction of the dependent variable.
- Therefore, the result can be stated as:

*The above table clearly states that the independent variable has no significant effect on the dependent variable; Wald $\chi^2 (3) = 3.302, p = .347$ (*i.e.*, $p > .05$).*

The result: Multicollinearity: **No**; Proportional odds: **Yes**, $\chi^2 (9) = 7.429, p = .593$ ($p > 0.05$); Pearson goodness-of-fit: **Yes**, $\chi^2 (9) = 5.903, p = .750$ (*i.e.*, $p > .05$); Deviance goodness-of-fit: **Yes**, $\chi^2 (9) = 7.429, p = .593$ (*i.e.*, $p > .05$); Likelihood-ratio test: **No**, $\chi^2 (3) = 3.265, p = .353$ (*i.e.* $p > .05$); Model Effects: **No**, Wald $\chi^2 (3) = 3.302, p = .347$ (*i.e.*, $p > .05$).

Discussion: Therefore, based on the analysis above, the conclusion here is that despite the fact that the model pass the multicollinearity test and meets the proportional odds and goodness of fit requirements, the two decisive factors of this analysis, the likelihood-ratio test and the tests of model effects suggest that the organization type **has no statistically significant effect** on HRIS-enabled day-to-day HR transactional record keeping practices such as, entering payroll information, employee status changes, *etc.* and HRM performance employee involvement, trust, loyalty, commitment and “social climate” between workers and management.

Analysis 8: A cumulative odds ordinal logistic regression with proportional odds was run to determine the effect of organization type on the belief that organization type significantly impacts HRIS-enabled human resources (HR) transactional employee benefits administration practices such as overseeing the health insurance coverage, administering investment and retirement program, *etc.* and HRM performance related to employee satisfaction, motivation, presence (obverse of absenteeism) and retention (obverse of turnover).

The results were analysed under three categories, namely test for multicollinearity, proportional odds (PLUM), model fit (PLUM and GENLIN) and test of model effects (GENLIN).

Test for multicollinearity:

Coefficients ^a			
Model		Collinearity Statistics	
		Tolerance	VIF
1	Private	.442	2.263
	Government	.509	1.964
	Semi_Government	.565	1.770

a. Dependent Variable: Q8 - HR-enabled
Transactional-HR Performance (Benefit
Admin-Satis.Motivation.Presense.Retention)

Since all the Tolerance values are greater than 0.1 (the lowest is 0.442) and VIF values are much less than 10, therefore, **there is no problem with collinearity** in this particular data set.

Proportional Odds

The assumption of proportional odds is fundamental to the particular type of (cumulative) ordinal logistic regression model. This assumption means that each independent variable has an identical effect at each cumulative split of the ordinal dependent variable.

- This assumption can be tested formally using the statistical test that is generated when the test of parallel lines option in the **Ordinal Regression: Output** dialogue box is selected and the **Test of Parallel Lines** table is presented.

Test of Parallel Lines ^a				
Model	-2 Log Likelihood	Chi-Square	df	Sig.
Null Hypothesis	51.396			
General	19.878	31.518	9	.000

The null hypothesis states that the location parameters (slope coefficients) are the same across response categories.

a. Link function: Logit.

- This test works by comparing the model fit (the **"-2 Log Likelihood"** column) to the two different cumulative odds models.
- The two models that are compared are the proportional odds model (the **"Null Hypothesis"** row) and the cumulative odds model *without* the proportional odds constraint/assumption (the **"General"** row); *i.e.*, a model where the slope coefficients (relationship) are allowed to be different for each cumulative logit.
- If the assumption of proportional odds is met, one would expect the difference in model fit (the **"Chi-square"** column) between these two models to be small and not statistically significant ($p > .05$).

- Alternatively, if the assumption of proportional odds is violated, one would expect the difference in fit between these two models to be large and statistically significant ($p < .05$).
- The statistical significance level (p -value) of this test can be found in the "Sig." column.
- In this analysis, $p = .000$, which is less than .05 and, therefore, the assumption of proportional odds is not met (*i.e.*, this assumption is not valid).
- To report this result:

*The assumption of proportional odds was not met, as assessed by a full likelihood ratio test comparing the residual of the fitted location model to a model with varying location parameters, $\chi^2(9) = 31.518, p = .000$ (*i.e.* $p < 0.05$).*

Model fit

1. Overall goodness-of-fit tests

SPSS generates two tests of the overall goodness-of-fit of the model (*i.e.*, an overall measure of whether the model fits the data well). These are the Pearson and Deviance goodness-of-fit tests, as shown below in the **Goodness-of-Fit** table:

Goodness-of-Fit			
	Chi-Square	df	Sig.
Pearson	17.604	9	.040
Deviance	17.648	9	.039

Link function: Logit.

- Both the Pearson (the "**Pearson Chi-Square**" row) and deviance (the "**Deviance**" row) statistics are designed to provide a measure of how poorly the model fits the data (or the variations in the model that cannot be explained).
- Because the test statistics measure how poor the model is, one is actually looking for these tests to be not statistically significant to indicate a good model fit (*i.e.*, $p > .05$ in the "Sig." column).
- Based on the analysis above, to report the result:
 - *The Pearson goodness-of-fit test indicated that the model was **not a good fit** to the observed data, $\chi^2(9) = 17.604, p = .040$ (*i.e.*, $p < .05$).*
 - *The Deviance goodness-of-fit test indicated that the model was **not a good fit** to the observed data, $\chi^2(9) = 17.648, p = .039$ (*i.e.*, $p < .05$).*

2. Likelihood-ratio test

A better method of assessing model fit is to look at the difference in model fit (in the PLUM analysis) when comparing the full model to the intercept-only model.

- The likelihood-ratio test is presented in the **Model Fitting Information** table, as shown below:

Model Fitting Information				
Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	52.174			
Final	51.396	.778	3	.855

Link function: Logit.

- The model fit (the "**-2 Log Likelihood**" column) is 52.174 for the intercept-only model (the "**Intercept Only**" row) compared to the model with the intercept and all independent variables (the "**Final**" row), which has a -2 log likelihood of 51.396.
- The smaller the -2 log likelihood value, the better the fit. As such, the greater the difference between the two models, the better the independent variable is at explaining the dependent variable.
- The difference between the two -2 log likelihood values is presented in the "**Chi-Square**" column with 3 degrees of freedom ("**df**") and the statistical significance level (p -value) of this test can be found in the "**Sig.**" column.
- If the significance value was less than .05 (*i.e.*, $p < .05$), the independent variables would add to the prediction of the dependent variable. Since the significance value was greater than .05 (*i.e.*, $p > .05$), the independent variable does not add to the prediction of the dependent variable.
- In this analysis, the result can be stated as:

*According to the Model Fitting Information table obtained from PLUM analysis, the independent variable does not add to the prediction of the dependent variable; $\chi^2(3) = .778$, $p = .855$, (*i.e.*, $p > .05$).*

GENLIN parameter estimates: Tests of Model Effects (Polytomous variables)

The GENLIN procedure reports an overall test of significance for each variable entered into the logistic regression model in the **Tests of Model Effects** table given below:

Tests of Model Effects

Source	Type III		
	Wald Chi-Square	df	Sig.
org_type	.788	3	.852

Dependent Variable: Q8 - HR-enabled Transactional-HR Performance (Benefit Admin-Satis.Motivation.Presence.Retention)
Model: (Threshold), org_type

- The table above shows the omnibus test result for the org_type variable using the Wald test statistic.
- The hypothesis test value is presented in the "**Wald Chi-Square**" column with 3 degrees of freedom ("**df**") and the statistical significance level (*p*-value) of this test can be found in the "**Sig.**" column.
- If the significance value was less than .05 (*i.e.*, $p < .05$), the independent variable would add to the prediction of the dependent variable. Since the significance value was greater than .05 (*i.e.*, $p > .05$), the independent variable does not add to the prediction of the dependent variable.
- Therefore, the result can be stated as:

*The above table clearly states that the independent variable has no significant effect on the dependent variable; Wald $\chi^2 (3) = .788, p = .852$ (*i.e.*, $p > .05$).*

The result: Multicollinearity: **No**; Proportional odds: **No**, $\chi^2 (9) = 31.518, p = .000$ ($p < .05$); Pearson goodness-of-fit: **No**, $\chi^2 (9) = 17.604, p = .040$ (*i.e.*, $p > .05$); Deviance goodness-of-fit: **No**, $\chi^2 (9) = 17.648, p = .039$ (*i.e.*, $p < .05$); Likelihood-ratio test: **No**, $\chi^2 (3) = .778, p = .588$ (*i.e.* $p > .05$); Model Effects: **No**, Wald $\chi^2 (3) = 0.788, p = .852$ (*i.e.*, $p > .05$).

Discussion: Therefore, based on the analysis above, the conclusion here is that despite the fact that the model pass the multicollinearity test but does not meets the proportional odds and goodness of fit requirements, the two decisive factors of this analysis, the likelihood-ratio test and the tests of model effects suggest that the organization type **has no statistically significant effect** on HRIS-enabled HR transactional employee benefits administration practices such as overseeing the health insurance coverage, administering investment and retirement program, *etc.* and HRM performance related to employee satisfaction, motivation, presence (obverse of absenteeism) and retention (obverse of turnover).

Analysis 9: A cumulative odds ordinal logistic regression with proportional odds was run to determine the effect of organization type on the belief that organization type significantly impacts HRIS-enabled human resources (HR) transactional employee benefits administration practices such as overseeing the health insurance coverage, administering investment and retirement program, etc. and HRM performance related to employee involvement, trust, loyalty, commitment and “social climate” between workers and management.

The results were analysed under three categories, namely test for multicollinearity, proportional odds (PLUM), model fit (PLUM and GENLIN) and test of model effects (GENLIN).

Test for multicollinearity:

Coefficients^a

Model		Collinearity Statistics	
		Tolerance	VIF
1	Private	.442	2.263
	Government	.509	1.964
	Semi_Government	.565	1.770

a. Dependent Variable: Q9 - HR-enabled Transactional-HR Performance (Benefit Admin-Invole.Trust.Loyal.commit.)

Since all the Tolerance values are greater than 0.1 (the lowest is 0.442) and VIF values are much less than 10, therefore, **there is no problem with collinearity** in this particular data set.

Proportional Odds

The assumption of proportional odds is fundamental to the particular type of (cumulative) ordinal logistic regression model. This assumption means that each independent variable has an identical effect at each cumulative split of the ordinal dependent variable.

- This assumption can be tested formally using the statistical test that is generated when the test of parallel lines option in the **Ordinal Regression: Output** dialogue box is selected and the **Test of Parallel Lines** table is presented.

Test of Parallel Lines^a

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Null Hypothesis	49.328			
General	36.247	13.080	9	.159

The null hypothesis states that the location parameters (slope coefficients) are the same across response categories.

a. Link function: Logit.

- This test works by comparing the model fit (the "**-2 Log Likelihood**" column) to the two different cumulative odds models.
- The two models that are compared are the proportional odds model (the "**Null Hypothesis**" row) and the cumulative odds model *without* the proportional odds constraint/assumption (the "**General**" row); *i.e.*, a model where the slope coefficients (relationship) are allowed to be different for each cumulative logit.
- If the assumption of proportional odds is met, one would expect the difference in model fit (the "**Chi-square**" column) between these two models to be small and not statistically significant ($p > .05$).
- Alternatively, if the assumption of proportional odds is violated, one would expect the difference in fit between these two models to be large and statistically significant ($p < .05$).
- The statistical significance level (p -value) of this test can be found in the "**Sig.**" column.
- In this analysis, $p = .746$, which is greater than .05 and, therefore, the assumption of proportional odds is met (*i.e.*, this assumption is valid).
- By not violating this assumption, one can treat each independent variable as having the same effect for each cumulative logit.
- To report this result:

*The assumption of proportional odds was met, as assessed by a full likelihood ratio test comparing the residual of the fitted location model to a model with varying location parameters, $\chi^2 (9) = 13.080, p = .159$ (*i.e.* $p > 0.05$).*

Model fit

1. Overall goodness-of-fit tests

SPSS generates two tests of the overall goodness-of-fit of the model (*i.e.*, an overall measure of whether the model fits the data well). These are the Pearson and Deviance goodness-of-fit tests, as shown below in the **Goodness-of-Fit** table:

Goodness-of-Fit			
	Chi-Square	df	Sig.
Pearson	10.932	9	.280
Deviance	13.080	9	.159

Link function: Logit.

- Both the Pearson (the "**Pearson Chi-Square**" row) and deviance (the "**Deviance**" row) statistics are designed to provide a measure of how poorly the model fits the data (or the variations in the model that cannot be explained).
- Because the test statistics measure how poor the model is, one is actually looking for these tests to be not statistically significant to indicate a good model fit (*i.e.*, $p > .05$ in the "**Sig.**" column).
- Based on the analysis above, to report the result:
 - *The Pearson goodness-of-fit test indicated that the model was **a good fit** to the observed data, $\chi^2 (9) = 10.932, p = .280$ (*i.e.*, $p > .05$).*
 - *The Deviance goodness-of-fit test indicated that the model was **a good fit** to the observed data, $\chi^2 (9) = 13.080, p = .159$ (*i.e.*, $p > .05$).*

2. Likelihood-ratio test

A better method of assessing model fit is to look at the difference in model fit (in the PLUM analysis) when comparing the full model to the intercept-only model.

- The likelihood-ratio test is presented in the **Model Fitting Information** table, as shown below:

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	50.069			
Final	49.328	.741	3	.863

Link function: Logit.

- The model fit (the "**-2 Log Likelihood**" column) is 50.069 for the intercept-only model (the "**Intercept Only**" row) compared to the model with the intercept and all independent variables (the "**Final**" row), which has a -2 log likelihood of 49.328.
- The smaller the -2 log likelihood value, the better the fit. As such, the greater the difference between the two models, the better the independent variable is at explaining the dependent variable.
- The difference between the two -2 log likelihood values is presented in the "**Chi-Square**" column with 3 degrees of freedom ("**df**") and the statistical significance level (p -value) of this test can be found in the "**Sig.**" column.
- If the significance value was less than .05 (*i.e.*, $p < .05$), the independent variables would add to the prediction of the dependent variable. Since the significance value was

greater than .05 (*i.e.*, $p > .05$), the independent variable does not add to the prediction of the dependent variable.

- In this analysis, the result can be stated as:

*According to the Model Fitting Information table obtained from PLUM analysis, the independent variable does not add to the prediction of the dependent variable; $\chi^2(3) = .741$, $p = .863$, (*i.e.*, $p > .05$).*

GENLIN parameter estimates: Tests of Model Effects (Polytomous variables)

The GENLIN procedure reports an overall test of significance for each variable entered into the logistic regression model in the **Tests of Model Effects** table given below:

Tests of Model Effects			
Source	Type III		
	Wald Chi-Square	df	Sig.
org_type	.772	3	.856

Dependent Variable: Q9 - HR-enabled
Transactional-HR Performance (Benefit Admin-
Invole.Trust.Loyal.commit.)
Model: (Threshold), org_type

- The table above shows the omnibus test result for the org_type variable using the Wald test statistic.
- The hypothesis test value is presented in the "**Wald Chi-Square**" column with 3 degrees of freedom ("**df**") and the statistical significance level (*p*-value) of this test can be found in the "**Sig.**" column.
- If the significance value was less than .05 (*i.e.*, $p < .05$), the independent variable would add to the prediction of the dependent variable. Since the significance value was greater than .05 (*i.e.*, $p > .05$), the independent variable does not add to the prediction of the dependent variable.
- Therefore, the result can be stated as:

*The above table clearly states that the independent variable has no significant effect on the dependent variable; Wald $\chi^2(3) = .772$, $p = .856$ (*i.e.*, $p > .05$).*

The result: Multicollinearity: **No**; Proportional odds: **Yes**, $\chi^2(9) = 13.080$, $p = .159$ ($p > 0.05$); Pearson goodness-of-fit: **Yes**, $\chi^2(9) = 10.932$, $p = .280$ (*i.e.*, $p > .05$); Deviance goodness-of-fit: **Yes**, $\chi^2(9) = 13.080$, $p = .159$ (*i.e.*, $p > .05$); Likelihood-ratio test: **No**, $\chi^2(3) = 0.741$, $p = .863$ (*i.e.* $p > .05$); Model Effects: **No**, Wald $\chi^2(3) = 0.772$, $p = .856$ (*i.e.*, $p > .05$).

Discussion: Therefore, based on the analysis above, the conclusion here is that despite the fact that the model pass the multicollinearity test and meets the proportional odds and goodness of fit requirements, the two decisive factors of this analysis, the likelihood-ratio test and the tests of model effects suggest that the organization type **has no statistically significant effect** on HRIS-enabled human resources transactional employee benefits administration practices such as overseeing the health insurance coverage, administering investment and retirement program, *etc.* and HRM performance employee involvement, trust, loyalty, commitment and “social climate” between workers and management.

Analysis 10: A cumulative odds ordinal logistic regression with proportional odds was run to determine the effect of organization type on the belief that organization type significantly impacts HRIS-enabled human resources (HR) traditional management practices related to employee recruitment, selection, training, promotion, and compensation, and HRM performance related to employee satisfaction, motivation, presence (obverse of absenteeism) and retention (obverse of turnover).

The results were analysed under three categories, namely test for multicollinearity, proportional odds (PLUM), model fit (PLUM and GENLIN) and test of model effects (GENLIN).

Test for multicollinearity:

Coefficients ^a			
Model		Collinearity Statistics	
		Tolerance	VIF
1	Private	.442	2.263
	Government	.509	1.964
	Semi_Government	.565	1.770

a. Dependent Variable: Q10 - HR-enabled Traditional-HR Performance (Day2Day-Satis. Motivation.Presense.Retention)

Since all the Tolerance values are greater than 0.1 (the lowest is 0.442) and VIF values are much less than 10, therefore, **there is no problem with collinearity** in this particular data set.

Proportional Odds

The assumption of proportional odds is fundamental to the particular type of (cumulative) ordinal logistic regression model. This assumption means that each independent variable has an identical effect at each cumulative split of the ordinal dependent variable.

- This assumption can be tested formally using the statistical test that is generated when the test of parallel lines option in the **Ordinal Regression: Output** dialogue box is selected and the **Test of Parallel Lines** table is presented.

Test of Parallel Lines^a

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Null Hypothesis	42.752			
General	35.911	6.841	9	.654

The null hypothesis states that the location parameters (slope coefficients) are the same across response categories.

a. Link function: Logit.

- This test works by comparing the model fit (the "**-2 Log Likelihood**" column) to the two different cumulative odds models.
- The two models that are compared are the proportional odds model (the "**Null Hypothesis**" row) and the cumulative odds model *without* the proportional odds constraint/assumption (the "**General**" row); *i.e.*, a model where the slope coefficients (relationship) are allowed to be different for each cumulative logit.
- If the assumption of proportional odds is met, one would expect the difference in model fit (the "**Chi-square**" column) between these two models to be small and not statistically significant ($p > .05$).
- Alternatively, if the assumption of proportional odds is violated, one would expect the difference in fit between these two models to be large and statistically significant ($p < .05$).
- The statistical significance level (p -value) of this test can be found in the "**Sig.**" column.
- In this analysis, $p = .654$, which is greater than .05 and, therefore, the assumption of proportional odds is met (*i.e.*, this assumption is valid).
- By not violating this assumption, one can treat each independent variable as having the same effect for each cumulative logit.
- To report this result:

*The assumption of proportional odds was met, as assessed by a full likelihood ratio test comparing the residual of the fitted location model to a model with varying location parameters, $\chi^2 (9) = 6.841$, $p = .654$ (*i.e.* $p > 0.05$).*

Model fit

1. Overall goodness-of-fit tests

SPSS generates two tests of the overall goodness-of-fit of the model (*i.e.*, an overall measure of whether the model fits the data well). These are the Pearson and Deviance goodness-of-fit tests, as shown below in the **Goodness-of-Fit** table:

Goodness-of-Fit			
	Chi-Square	df	Sig.
Pearson	6.633	9	.675
Deviance	6.841	9	.654

Link function: Logit.

- Both the Pearson (the "**Pearson Chi-Square**" row) and deviance (the "**Deviance**" row) statistics are designed to provide a measure of how poorly the model fits the data (or the variations in the model that cannot be explained).
- Because the test statistics measure how poor the model is, one is actually looking for these tests to be not statistically significant to indicate a good model fit (*i.e.*, $p > .05$ in the "**Sig.**" column).
- Based on the analysis above, to report the result:
 - *The Pearson goodness-of-fit test indicated that the model was **a good fit** to the observed data, $\chi^2(9) = 6.633, p = .675$ (*i.e.*, $p > .05$).*
 - *The Deviance goodness-of-fit test indicated that the model was **a good fit** to the observed data, $\chi^2(9) = 6.841, p = .654$ (*i.e.*, $p > .05$).*

2. Likelihood-ratio test

A better method of assessing model fit is to look at the difference in model fit (in the PLUM analysis) when comparing the full model to the intercept-only model.

- The likelihood-ratio test is presented in the **Model Fitting Information** table, as shown below:

Model Fitting Information				
Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	46.105			
Final	42.752	3.353	3	.340

Link function: Logit.

- The model fit (the "**-2 Log Likelihood**" column) is 46.105 for the intercept-only model (the "**Intercept Only**" row) compared to the model with the intercept and all independent variables (the "**Final**" row), which has a -2 log likelihood of 42.752.
- The smaller the -2 log likelihood value, the better the fit. As such, the greater the difference between the two models, the better the independent variable is at explaining the dependent variable.
- The difference between the two -2 log likelihood values is presented in the "**Chi-Square**" column with 3 degrees of freedom ("**df**") and the statistical significance level (*p*-value) of this test can be found in the "**Sig.**" column.
- If the significance value was less than .05 (*i.e.*, $p < .05$), the independent variables would add to the prediction of the dependent variable. Since the significance value was greater than .05 (*i.e.*, $p > .05$), the independent variable does not add to the prediction of the dependent variable.
- In this analysis, the result can be stated as:

*According to the Model Fitting Information table obtained from PLUM analysis, the independent variable does not add to the prediction of the dependent variable; $\chi^2(3) = 3.353$, $p = .340$, (*i.e.*, $p > .05$).*

GENLIN parameter estimates: Tests of Model Effects (Polytomous variables)

The GENLIN procedure reports an overall test of significance for each variable entered into the logistic regression model in the **Tests of Model Effects** table given below:

Tests of Model Effects			
Source	Type III		
	Wald Chi-Square	df	Sig.
org_type	.772	3	.856

Dependent Variable: Q9 - HR-enabled
Transactional-HR Performance (Benefit Admin-
Invole.Trust.Loyal.commit.)
Model: (Threshold), org_type

- The table above shows the omnibus test result for the org_type variable using the Wald test statistic.
- The hypothesis test value is presented in the "**Wald Chi-Square**" column with 3 degrees of freedom ("**df**") and the statistical significance level (*p*-value) of this test can be found in the "**Sig.**" column.
- If the significance value was less than .05 (*i.e.*, $p < .05$), the independent variable would add to the prediction of the dependent variable. Since the significance value was greater

than .05 (i.e., $p > .05$), the independent variable does not add to the prediction of the dependent variable.

- Therefore, the result can be stated as:

The above table clearly states that the independent variable has no significant effect on the dependent variable; Wald $\chi^2 (3) = .772, p = .856$ (i.e., $p > .05$).

The result: Multicollinearity: **No**; Proportional odds: **Yes**, $\chi^2 (9) = 6.841, p = .654$ ($p > 0.05$); Pearson goodness-of-fit: **Yes**, $\chi^2 (9) = 6.633, p = .675$ (i.e., $p > .05$); Deviance goodness-of-fit: **Yes**, $\chi^2 (9) = 6.841, p = .654$ (i.e., $p > .05$); Likelihood-ratio test: **No**, $\chi^2 (3) = 3.353, p = .340$ (i.e. $p > .05$); Model Effects: **No**, Wald $\chi^2 (3) = 3.351, p = .341$ (i.e., $p > .05$).

Discussion: Therefore, based on the analysis above, the conclusion here is that despite the fact that the model pass the multicollinearity test and meets the proportional odds and goodness of fit requirements, the two decisive factors of this analysis, the likelihood-ratio test and the tests of model effects suggest that the organization type **has no statistically significant effect** on HRIS-enabled human resources traditional management practices related to employee recruitment, selection, training, promotion, and compensation, and HRM performance related to employee satisfaction, motivation, presence (obverse of absenteeism) and retention (obverse of turnover).

Analysis 11: A cumulative odds ordinal logistic regression with proportional odds was run to determine the effect of organization type on the belief that organization type significantly impacts HRIS-enabled human resources (HR) traditional management practices related to employee recruitment, selection, training, promotion, and compensation, and HRM performance related to employee involvement, trust, loyalty, commitment and “social climate” between workers and management.

The results were analysed under three categories, namely test for multicollinearity, proportional odds (PLUM), model fit (PLUM and GENLIN) and test of model effects (GENLIN).

Test for multicollinearity:

Coefficients ^a			
Model		Collinearity Statistics	
		Tolerance	VIF
1	Private	.442	2.263
	Government	.509	1.964
	Semi_Government	.565	1.770

a. Dependent Variable: Q11 - HR-enabled Traditional-HR Performance (Day2Day-Involve.Trust.Loyal.commit.)

Since all the Tolerance values are greater than 0.1 (the lowest is 0.442) and VIF values are much less than 10, therefore, **there is no problem with collinearity** in this particular data set.

Proportional Odds

The assumption of proportional odds is fundamental to the particular type of (cumulative) ordinal logistic regression model. This assumption means that each independent variable has an identical effect at each cumulative split of the ordinal dependent variable.

- This assumption can be tested formally using the statistical test that is generated when the test of parallel lines option in the **Ordinal Regression: Output** dialogue box is selected and the **Test of Parallel Lines** table is presented.

Test of Parallel Lines^a

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Null Hypothesis	45.024			
General	21.384	23.640	9	.005

The null hypothesis states that the location parameters (slope coefficients) are the same across response categories.

a. Link function: Logit.

- This test works by comparing the model fit (the "**-2 Log Likelihood**" column) to the two different cumulative odds models.
- The two models that are compared are the proportional odds model (the "**Null Hypothesis**" row) and the cumulative odds model *without* the proportional odds constraint/assumption (the "**General**" row); *i.e.*, a model where the slope coefficients (relationship) are allowed to be different for each cumulative logit.
- If the assumption of proportional odds is met, one would expect the difference in model fit (the "**Chi-square**" column) between these two models to be small and not statistically significant ($p > .05$).
- Alternatively, if the assumption of proportional odds is violated, one would expect the difference in fit between these two models to be large and statistically significant ($p < .05$).
- The statistical significance level (p -value) of this test can be found in the "**Sig.**" column.
- In this analysis, $p = .005$, which is less than .05 and, therefore, the assumption of proportional odds is not met (*i.e.*, this assumption is not valid).
- To report this result:

The assumption of proportional odds was not met, as assessed by a full likelihood ratio test comparing the residual of the fitted location model to a model with varying location parameters, $\chi^2(9) = 23.640, p = .005$ (i.e. $p < 0.05$).

Model fit

1. Overall goodness-of-fit tests

SPSS generates two tests of the overall goodness-of-fit of the model (i.e., an overall measure of whether the model fits the data well). These are the Pearson and Deviance goodness-of-fit tests, as shown below in the **Goodness-of-Fit** table:

Goodness-of-Fit			
	Chi-Square	df	Sig.
Pearson	11.560	9	.239
Deviance	10.470	9	.314

Link function: Logit.

- Both the Pearson (the "**Pearson Chi-Square**" row) and deviance (the "**Deviance**" row) statistics are designed to provide a measure of how poorly the model fits the data (or the variations in the model that cannot be explained).
- Because the test statistics measure how poor the model is, one is actually looking for these tests to be not statistically significant to indicate a good model fit (i.e., $p > .05$ in the "**Sig.**" column).
- Based on the analysis above, to report the result:
 - *The Pearson goodness-of-fit test indicated that the model was **a good fit** to the observed data, $\chi^2(9) = 11.560, p = .239$ (i.e., $p > .05$).*
 - *The Deviance goodness-of-fit test indicated that the model was **a good fit** to the observed data, $\chi^2(9) = 10.470, p = .314$ (i.e., $p > .05$).*

2. Likelihood-ratio test

A better method of assessing model fit is to look at the difference in model fit (in the PLUM analysis) when comparing the full model to the intercept-only model.

- The likelihood-ratio test is presented in the **Model Fitting Information** table, as shown below:

Model Fitting Information

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	49.607			
Final	45.024	4.582	3	.205

Link function: Logit.

- The model fit (the "**-2 Log Likelihood**" column) is 49.607 for the intercept-only model (the "**Intercept Only**" row) compared to the model with the intercept and all independent variables (the "**Final**" row), which has a -2 log likelihood of 45.024.
- The smaller the -2 log likelihood value, the better the fit. As such, the greater the difference between the two models, the better the independent variable is at explaining the dependent variable.
- The difference between the two -2 log likelihood values is presented in the "**Chi-Square**" column with 3 degrees of freedom ("**df**") and the statistical significance level (*p*-value) of this test can be found in the "**Sig.**" column.
- If the significance value was less than .05 (*i.e.*, $p < .05$), the independent variables would add to the prediction of the dependent variable. Since the significance value was greater than .05 (*i.e.*, $p > .05$), the independent variable does not add to the prediction of the dependent variable.
- In this analysis, the result can be stated as:

*According to the Model Fitting Information table obtained from PLUM analysis, the independent variable does not add to the prediction of the dependent variable; $\chi^2(3) = 4.582$, $p = .205$, (*i.e.*, $p > .05$).*

GENLIN parameter estimates: Tests of Model Effects (Polytomous variables)

The GENLIN procedure reports an overall test of significance for each variable entered into the logistic regression model in the **Tests of Model Effects** table given below:

Tests of Model Effects

Source	Type III		
	Wald Chi-Square	df	Sig.
org_type	4.386	3	.223

Dependent Variable: Q11 - HR-enabled
Traditional-HR Performance (Day2Day-Invole.
Trust.Loyal.commit.)
Model: (Threshold), org_type

- The table above shows the omnibus test result for the org_type variable using the Wald test statistic.

- The hypothesis test value is presented in the "**Wald Chi-Square**" column with 3 degrees of freedom ("**df**") and the statistical significance level (*p*-value) of this test can be found in the "**Sig.**" column.
- If the significance value was less than .05 (*i.e.*, $p < .05$), the independent variable would add to the prediction of the dependent variable. Since the significance value was greater than .05 (*i.e.*, $p > .05$), the independent variable does not add to the prediction of the dependent variable.
- Therefore, the result can be stated as:

*The above table clearly states that the independent variable has no significant effect on the dependent variable; Wald $\chi^2 (3) = 4.386, p = .223$ (*i.e.*, $p > .05$).*

The result: Multicollinearity: **No**; Proportional odds: **No**, $\chi^2 (9) = 23.640, p = .005$ ($p < 0.05$); Pearson goodness-of-fit: **Yes**, $\chi^2 (9) = 11.560, p = .239$ (*i.e.*, $p > .05$); Deviance goodness-of-fit: **Yes**, $\chi^2 (9) = 10.470, p = .314$ (*i.e.*, $p > .05$); Likelihood-ratio test: **No**, $\chi^2 (3) = 4.582, p = .205$ (*i.e.* $p > .05$); Model Effects: **No**, Wald $\chi^2 (3) = 4.386, p = .223$ (*i.e.*, $p > .05$).

Discussion: Therefore, based on the analysis above, the conclusion here is that despite the fact that the model pass the multicollinearity test and goodness of fit requirements but does not meets the proportional requirements, the two decisive factors of this analysis, the likelihood-ratio test and the tests of model effects suggest that the organization type **has no statistically significant effect** on Impacts of organization type on HRIS-enabled human resources (HR) traditional management practices related to employee recruitment, selection, training, promotion, and compensation, and HRM performance employee involvement, trust, loyalty, commitment and “social climate” between workers and management.

Analysis 12: A cumulative odds ordinal logistic regression with proportional odds was run to determine the effect of organization type on the belief that organization type significantly impacts HRIS-enabled human resources (HR) traditional management practices related to employee performance management, rewards, career development and communication (employee relations), and HRM performance related to employee satisfaction, motivation, presence (obverse of absenteeism) and retention (obverse of turnover).

The results were analysed under three categories, namely test for multicollinearity, proportional odds (PLUM), model fit (PLUM and GENLIN) and test of model effects (GENLIN).

Test for multicollinearity:

Coefficients ^a			
Model		Collinearity Statistics	
		Tolerance	VIF
1	Private	.442	2.263
	Government	.509	1.964
	Semi_Government	.565	1.770

a. Dependent Variable: Q12 - HR-enabled
Traditional-HR Performance (Benefit Admin-
Satis.Motivation.Presense.Retention)

Since all the Tolerance values are greater than 0.1 (the lowest is 0.442) and VIF values are much less than 10, therefore, **there is no problem with collinearity** in this particular data set.

Proportional Odds

The assumption of proportional odds is fundamental to the particular type of (cumulative) ordinal logistic regression model. This assumption means that each independent variable has an identical effect at each cumulative split of the ordinal dependent variable.

- This assumption can be tested formally using the statistical test that is generated when the test of parallel lines option in the **Ordinal Regression: Output** dialogue box is selected and the **Test of Parallel Lines** table is presented.

Test of Parallel Lines ^a				
Model	-2 Log Likelihood	Chi-Square	df	Sig.
Null Hypothesis	36.108			
General	30.436	5.673	6	.461

The null hypothesis states that the location parameters (slope coefficients) are the same across response categories.

a. Link function: Logit.

- This test works by comparing the model fit (the **"-2 Log Likelihood"** column) to the two different cumulative odds models.
- The two models that are compared are the proportional odds model (the **"Null Hypothesis"** row) and the cumulative odds model *without* the proportional odds constraint/assumption (the **"General"** row); *i.e.*, a model where the slope coefficients (relationship) are allowed to be different for each cumulative logit.
- If the assumption of proportional odds is met, one would expect the difference in model fit (the **"Chi-square"** column) between these two models to be small and not statistically significant ($p > .05$).

- Alternatively, if the assumption of proportional odds is violated, one would expect the difference in fit between these two models to be large and statistically significant ($p < .05$).
- The statistical significance level (p -value) of this test can be found in the "Sig." column.
- In this analysis, $p = .461$, which is greater than .05 and, therefore, the assumption of proportional odds is met (*i.e.*, this assumption is valid).
- To report this result:

*The assumption of proportional odds was met, as assessed by a full likelihood ratio test comparing the residual of the fitted location model to a model with varying location parameters, $\chi^2 (9) = 5.673$, $p = .461$ (*i.e.* $p > 0.05$).*

Model fit

1. Overall goodness-of-fit tests

SPSS generates two tests of the overall goodness-of-fit of the model (*i.e.*, an overall measure of whether the model fits the data well). These are the Pearson and Deviance goodness-of-fit tests, as shown below in the **Goodness-of-Fit** table:

Goodness-of-Fit			
	Chi-Square	df	Sig.
Pearson	5.725	6	.455
Deviance	5.673	6	.461

Link function: Logit.

- Both the Pearson (the "**Pearson Chi-Square**" row) and deviance (the "**Deviance**" row) statistics are designed to provide a measure of how poorly the model fits the data (or the variations in the model that cannot be explained).
- Because the test statistics measure how poor the model is, one is actually looking for these tests to be not statistically significant to indicate a good model fit (*i.e.*, $p > .05$ in the "Sig." column).
- Based on the analysis above, to report the result:
 - *The Pearson goodness-of-fit test indicated that the model was **a good fit** to the observed data, $\chi^2 (9) = 5.725$, $p = .455$ (*i.e.*, $p > .05$).*
 - *The Deviance goodness-of-fit test indicated that the model was **a good fit** to the observed data, $\chi^2 (9) = 5.673$, $p = .461$ (*i.e.*, $p > .05$).*

2. Likelihood-ratio test

A better method of assessing model fit is to look at the difference in model fit (in the PLUM analysis) when comparing the full model to the intercept-only model.

- The likelihood-ratio test is presented in the **Model Fitting Information** table, as shown below:

Model Fitting Information				
Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	43.789			
Final	36.108	7.681	3	.053

Link function: Logit.

- The model fit (the "**-2 Log Likelihood**" column) is 43.789 for the intercept-only model (the "**Intercept Only**" row) compared to the model with the intercept and all independent variables (the "**Final**" row), which has a -2 log likelihood of 36.108.
- The smaller the -2 log likelihood value, the better the fit. As such, the greater the difference between the two models, the better the independent variable is at explaining the dependent variable.
- The difference between the two -2 log likelihood values is presented in the "**Chi-Square**" column with 3 degrees of freedom ("**df**") and the statistical significance level (*p*-value) of this test can be found in the "**Sig.**" column.
- If the significance value was less than .05 (*i.e.*, $p < .05$), the independent variables would add to the prediction of the dependent variable. Since the significance value was greater than .05 (*i.e.*, $p > .05$), the independent variable does not add to the prediction of the dependent variable.
- In this analysis, the result can be stated as:

*According to the Model Fitting Information table obtained from PLUM analysis, the independent variable does not add to the prediction of the dependent variable; $\chi^2(3) = 7.681$, $p = .053$, (*i.e.*, $p > .05$).*

GENLIN parameter estimates: Tests of Model Effects (Polytomous variables)

The GENLIN procedure reports an overall test of significance for each variable entered into the logistic regression model in the **Tests of Model Effects** table given below:

Tests of Model Effects

Source	Type III		
	Wald Chi-Square	df	Sig.
org_type	7.099	3	.069

Dependent Variable: Q12 - HR-enabled
Traditional-HR Performance (Benefit Admin-Satis.
Motivation.Presence.Retention)
Model: (Threshold), org_type

- The table above shows the omnibus test result for the org_type variable using the Wald test statistic.
- The hypothesis test value is presented in the "**Wald Chi-Square**" column with 3 degrees of freedom ("**df**") and the statistical significance level (*p*-value) of this test can be found in the "**Sig.**" column.
- If the significance value was less than .05 (*i.e.*, $p < .05$), the independent variable would add to the prediction of the dependent variable. Since the significance value was greater than .05 (*i.e.*, $p > .05$), the independent variable does not add to the prediction of the dependent variable.
- Therefore, the result can be stated as:

*The above table clearly states that the independent variable has no significant effect on the dependent variable; Wald $\chi^2 (3) = 7.099$, $p = .069$ (*i.e.*, $p > .05$).*

The result: Multicollinearity: **No**; Proportional odds: **Yes**, $\chi^2 (9) = 5.673$, $p = .461$ ($p > 0.05$); Pearson goodness-of-fit: **Yes**, $\chi^2 (9) = 5.725$, $p = .455$ (*i.e.*, $p > .05$); Deviance goodness-of-fit: **Yes**, $\chi^2 (9) = 5.673$, $p = .461$ (*i.e.*, $p > .05$); Likelihood-ratio test: **No**, $\chi^2 (3) = 7.681$, $p = .053$ (*i.e.* $p > .05$); Model Effects: **No**, Wald $\chi^2 (3) = 7.099$, $p = .069$ (*i.e.*, $p > .05$).

Discussion: Therefore, based on the analysis above, the conclusion here is that despite the fact that the model pass the multicollinearity test and meets the proportional odds and goodness of fit requirements, the two decisive factors of this analysis, the likelihood-ratio test and the tests of model effects suggest that the organization type **has no statistically significant effect** on HRIS-enabled HR traditional management practices related to employee performance management, rewards, career development and communication (employee relations), and HRM performance related to employee satisfaction, motivation, presence (obverse of absenteeism) and retention (obverse of turnover).

Analysis 13: A cumulative odds ordinal logistic regression with proportional odds was run to determine the effect of organization type on the belief that organization type significantly impacts HRIS-enabled human resources (HR) traditional management practices related to employee performance management, rewards, career development and communication (employee relations), and HRM performance related to employee involvement, trust, loyalty, commitment and “social climate” between workers and management.

The results were analysed under three categories, namely test for multicollinearity, proportional odds (PLUM), model fit (PLUM and GENLIN) and test of model effects (GENLIN).

Test for multicollinearity:

Coefficients^a

Model		Collinearity Statistics	
		Tolerance	VIF
1	Private	.442	2.263
	Government	.509	1.964
	Semi_Government	.565	1.770

a. Dependent Variable: Q13 - HR-enabled Traditional-HR Performance (Benefit Admin-Invole.Trust.Loyal.commit.)

Since all the Tolerance values are greater than 0.1 (the lowest is 0.442) and VIF values are much less than 10, therefore, **there is no problem with collinearity** in this particular data set.

Proportional Odds

The assumption of proportional odds is fundamental to the particular type of (cumulative) ordinal logistic regression model. This assumption means that each independent variable has an identical effect at each cumulative split of the ordinal dependent variable.

- This assumption can be tested formally using the statistical test that is generated when the test of parallel lines option in the **Ordinal Regression: Output** dialogue box is selected and the **Test of Parallel Lines** table is presented.

Test of Parallel Lines^a

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Null Hypothesis	42.403			
General	34.546	7.857	9	.549

The null hypothesis states that the location parameters (slope coefficients) are the same across response categories.

a. Link function: Logit.

- This test works by comparing the model fit (the **"-2 Log Likelihood"** column) to the two different cumulative odds models.
- The two models that are compared are the proportional odds model (the **"Null Hypothesis"** row) and the cumulative odds model *without* the proportional odds constraint/assumption (the **"General"** row); *i.e.*, a model where the slope coefficients (relationship) are allowed to be different for each cumulative logit.
- If the assumption of proportional odds is met, one would expect the difference in model fit (the **"Chi-square"** column) between these two models to be small and not statistically significant ($p > .05$).
- Alternatively, if the assumption of proportional odds is violated, one would expect the difference in fit between these two models to be large and statistically significant ($p < .05$).
- The statistical significance level (p -value) of this test can be found in the **"Sig."** column.
- In this analysis, $p = .549$, which is greater than .05 and, therefore, the assumption of proportional odds is met (*i.e.*, this assumption is valid).
- To report this result:

*The assumption of proportional odds was met, as assessed by a full likelihood ratio test comparing the residual of the fitted location model to a model with varying location parameters, $\chi^2 (9) = 7.857, p = .549$ (*i.e.* $p > 0.05$).*

Model fit

1. Overall goodness-of-fit tests

SPSS generates two tests of the overall goodness-of-fit of the model (*i.e.*, an overall measure of whether the model fits the data well). These are the Pearson and Deviance goodness-of-fit tests, as shown below in the **Goodness-of-Fit** table:

Goodness-of-Fit			
	Chi-Square	df	Sig.
Pearson	7.511	9	.584
Deviance	7.857	9	.549

Link function: Logit.

- Both the Pearson (the **"Pearson Chi-Square"** row) and deviance (the **"Deviance"** row) statistics are designed to provide a measure of how poorly the model fits the data (or the variations in the model that cannot be explained).

- Because the test statistics measure how poor the model is, one is actually looking for these tests to be not statistically significant to indicate a good model fit (*i.e.*, $p > .05$ in the "**Sig.**" column).
- Based on the analysis above, to report the result:
 - *The Pearson goodness-of-fit test indicated that the model was **a good fit** to the observed data, $\chi^2 (9) = 7.511, p = .584$ (*i.e.*, $p > .05$).*
 - *The Deviance goodness-of-fit test indicated that the model was **a good fit** to the observed data, $\chi^2 (9) = 7.857, p = .549$ (*i.e.*, $p > .05$).*

2. Likelihood-ratio test

A better method of assessing model fit is to look at the difference in model fit (in the PLUM analysis) when comparing the full model to the intercept-only model.

- The likelihood-ratio test is presented in the **Model Fitting Information** table, as shown below:

Model Fitting Information				
Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	47.320			
Final	42.403	4.916	3	.178

Link function: Logit.

- The model fit (the "**-2 Log Likelihood**" column) is 47.320 for the intercept-only model (the "**Intercept Only**" row) compared to the model with the intercept and all independent variables (the "**Final**" row), which has a -2 log likelihood of 42.403.
- The smaller the -2 log likelihood value, the better the fit. As such, the greater the difference between the two models, the better the independent variable is at explaining the dependent variable.
- The difference between the two -2 log likelihood values is presented in the "**Chi-Square**" column with 3 degrees of freedom ("**df**") and the statistical significance level (p -value) of this test can be found in the "**Sig.**" column.
- If the significance value was less than .05 (*i.e.*, $p < .05$), the independent variables would add to the prediction of the dependent variable. Since the significance value was greater than .05 (*i.e.*, $p > .05$), the independent variable does not add to the prediction of the dependent variable.
- In this analysis, the result can be stated as:

According to the Model Fitting Information table obtained from PLUM analysis, the independent variable does not add to the prediction of the dependent variable; $\chi^2 (3) = 4.916, p = .178$, (i.e., $p > .05$).

GENLIN parameter estimates: Tests of Model Effects (Polytomous variables)

The GENLIN procedure reports an overall test of significance for each variable entered into the logistic regression model in the **Tests of Model Effects** table given below:

Tests of Model Effects			
Source	Type III		
	Wald Chi-Square	df	Sig.
org_type	4.713	3	.194

Dependent Variable: Q13 - HR-enabled
Traditional-HR Performance (Benefit Admin-
Invole.Trust.Loyal.commit.)
Model: (Threshold), org_type

- The table above shows the omnibus test result for the org_type variable using the Wald test statistic.
- The hypothesis test value is presented in the "**Wald Chi-Square**" column with 3 degrees of freedom ("**df**") and the statistical significance level (p -value) of this test can be found in the "**Sig.**" column.
- If the significance value was less than .05 (i.e., $p < .05$), the independent variable would add to the prediction of the dependent variable. Since the significance value was greater than .05 (i.e., $p > .05$), the independent variable does not add to the prediction of the dependent variable.
- Therefore, the result can be stated as:

The above table clearly states that the independent variable has no significant effect on the dependent variable; Wald $\chi^2 (3) = 4.713, p = .194$ (i.e., $p > .05$).

The result: Multicollinearity: **No**; Proportional odds: **Yes**, $\chi^2 (9) = 7.857, p = .549$ ($p > 0.05$); Pearson goodness-of-fit: **Yes**, $\chi^2 (9) = 7.511, p = .584$ (i.e., $p > .05$); Deviance goodness-of-fit: **Yes**, $\chi^2 (9) = 7.857, p = .549$ (i.e., $p > .05$); Likelihood-ratio test: **No**, $\chi^2 (3) = 4.916, p = .178$ (i.e. $p > .05$); Model Effects: **No**, Wald $\chi^2 (3) = 4.713, p = .194$ (i.e., $p > .05$).

Discussion: Therefore, based on the analysis above, the conclusion here is that despite the fact that the model pass the multicollinearity test and meets the proportional odds and goodness of fit requirements, the two decisive factors of this analysis, the

likelihood-ratio test and the tests of model effects suggest that the organization type **has no statistically significant effect** on HRIS-enabled HR traditional management practices related to employee performance management, rewards, career development and communication (employee relations), and HRM performance employee involvement, trust, loyalty, commitment and “social climate” between workers and management.

Analysis 14: A cumulative odds ordinal logistic regression with proportional odds was run to determine the effect of organization type on the belief that organization type significantly impacts HRIS-enabled human resources (HR) transformational management practices that meet strategic organizational objectives such as strategic planning, organizational development, knowledge management and change management, and HRM performance related to employee satisfaction, motivation, presence (obverse of absenteeism) and retention (obverse of turnover). The results were analysed under three categories, namely test for multicollinearity, proportional odds (PLUM), model fit (PLUM and GENLIN) and test of model effects (GENLIN).

Test for multicollinearity:

Coefficients^a

Model		Collinearity Statistics	
		Tolerance	VIF
1	Private	.442	2.263
	Government	.509	1.964
	Semi_Government	.565	1.770

a. Dependent Variable: Q14 - HR-enabled Transformational-HR Performance (Transformational-Satis.Motivation.Presense. Retention)

Since all the Tolerance values are greater than 0.1 (the lowest is 0.442) and VIF values are much less than 10, therefore, **there is no problem with collinearity** in this particular data set.

Proportional Odds

The assumption of proportional odds is fundamental to the particular type of (cumulative) ordinal logistic regression model. This assumption means that each independent variable has an identical effect at each cumulative split of the ordinal dependent variable.

- This assumption can be tested formally using the statistical test that is generated when the test of parallel lines option in the **Ordinal Regression: Output** dialogue box is selected and the **Test of Parallel Lines** table is presented.

Test of Parallel Lines^a

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Null Hypothesis	43.748			
General	36.226	7.522	9	.583

The null hypothesis states that the location parameters (slope coefficients) are the same across response categories.

a. Link function: Logit.

- This test works by comparing the model fit (the "**-2 Log Likelihood**" column) to the two different cumulative odds models.
- The two models that are compared are the proportional odds model (the "**Null Hypothesis**" row) and the cumulative odds model *without* the proportional odds constraint/assumption (the "**General**" row); *i.e.*, a model where the slope coefficients (relationship) are allowed to be different for each cumulative logit.
- If the assumption of proportional odds is met, one would expect the difference in model fit (the "**Chi-square**" column) between these two models to be small and not statistically significant ($p > .05$).
- Alternatively, if the assumption of proportional odds is violated, one would expect the difference in fit between these two models to be large and statistically significant ($p < .05$).
- The statistical significance level (p -value) of this test can be found in the "**Sig.**" column.
- In this analysis, $p = .583$, which is greater than .05 and, therefore, the assumption of proportional odds is met (*i.e.*, this assumption is valid).
- To report this result:

*The assumption of proportional odds was met, as assessed by a full likelihood ratio test comparing the residual of the fitted location model to a model with varying location parameters, $\chi^2 (9) = 7.522$, $p = .583$ (*i.e.* $p > 0.05$).*

Model fit

1. Overall goodness-of-fit tests

SPSS generates two tests of the overall goodness-of-fit of the model (*i.e.*, an overall measure of whether the model fits the data well). These are the Pearson and Deviance goodness-of-fit tests, as shown below in the **Goodness-of-Fit** table:

Goodness-of-Fit

	Chi-Square	df	Sig.
Pearson	6.683	9	.670
Deviance	7.522	9	.583

Link function: Logit.

- Both the Pearson (the "**Pearson Chi-Square**" row) and deviance (the "**Deviance**" row) statistics are designed to provide a measure of how poorly the model fits the data (or the variations in the model that cannot be explained).
- Because the test statistics measure how poor the model is, one is actually looking for these tests to be not statistically significant to indicate a good model fit (*i.e.*, $p > .05$ in the "**Sig.**" column).
- Based on the analysis above, to report the result:
 - *The Pearson goodness-of-fit test indicated that the model was **a good fit** to the observed data, $\chi^2(9) = 6.683, p = .670$ (*i.e.*, $p > .05$).*
 - *The Deviance goodness-of-fit test indicated that the model was **a good fit** to the observed data, $\chi^2(9) = 7.522, p = .583$ (*i.e.*, $p > .05$).*

2. Likelihood-ratio test

A better method of assessing model fit is to look at the difference in model fit (in the PLUM analysis) when comparing the full model to the intercept-only model.

- The likelihood-ratio test is presented in the **Model Fitting Information** table, as shown below:

Model Fitting Information

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	47.210			
Final	43.748	3.462	3	.326

Link function: Logit.

- The model fit (the "**-2 Log Likelihood**" column) is 47.210 for the intercept-only model (the "**Intercept Only**" row) compared to the model with the intercept and all independent variables (the "**Final**" row), which has a -2 log likelihood of 43.748.
- The smaller the -2 log likelihood value, the better the fit. As such, the greater the difference between the two models, the better the independent variable is at explaining the dependent variable.

- The difference between the two -2 log likelihood values is presented in the "**Chi-Square**" column with 3 degrees of freedom ("**df**") and the statistical significance level (p -value) of this test can be found in the "**Sig.**" column.
- If the significance value was less than .05 (*i.e.*, $p < .05$), the independent variables would add to the prediction of the dependent variable. Since the significance value was greater than .05 (*i.e.*, $p > .05$), the independent variable does not add to the prediction of the dependent variable.
- In this analysis, the result can be stated as:

*According to the Model Fitting Information table obtained from PLUM analysis, the independent variable does not add to the prediction of the dependent variable; $\chi^2(3) = 3.462$, $p = .326$, (*i.e.*, $p > .05$).*

GENLIN parameter estimates: Tests of Model Effects (Polytomous variables)

The GENLIN procedure reports an overall test of significance for each variable entered into the logistic regression model in the **Tests of Model Effects** table given below:

Tests of Model Effects			
Source	Type III		
	Wald Chi-Square	df	Sig.
org_type	3.416	3	.332

Dependent Variable: Q14 - HR-enabled Transformational-HR Performance (Transformational-Satis.Motivation.Presense. Retention)
Model: (Threshold), org_type

- The table above shows the omnibus test result for the org_type variable using the Wald test statistic.
- The hypothesis test value is presented in the "**Wald Chi-Square**" column with 3 degrees of freedom ("**df**") and the statistical significance level (p -value) of this test can be found in the "**Sig.**" column.
- If the significance value was less than .05 (*i.e.*, $p < .05$), the independent variable would add to the prediction of the dependent variable. Since the significance value was greater than .05 (*i.e.*, $p > .05$), the independent variable does not add to the prediction of the dependent variable.
- Therefore, the result can be stated as:

*The above table clearly states that the independent variable has no significant effect on the dependent variable; Wald $\chi^2(3) = 3.416$, $p = .332$ (*i.e.*, $p > .05$).*

The result: Multicollinearity: **No**; Proportional odds: **Yes**, $\chi^2 (9) = 7.522, p = .583$ ($p > 0.05$); Pearson goodness-of-fit: **Yes**, $\chi^2 (9) = 6.683, p = .670$ (*i.e.*, $p > .05$); Deviance goodness-of-fit: **Yes**, $\chi^2 (9) = 7.522, p = .583$ (*i.e.*, $p > .05$); Likelihood-ratio test: **No**, $\chi^2 (3) = 3.462, p = .326$ (*i.e.* $p > .05$); Model Effects: **No**, Wald $\chi^2 (3) = 3.416, p = .332$ (*i.e.*, $p > .05$).

Discussion: Therefore, based on the analysis above, the conclusion here is that despite the fact that the model pass the multicollinearity test and meets the proportional odds and goodness of fit requirements, the two decisive factors of this analysis, the likelihood-ratio test and the tests of model effects suggest that the organization type **has no statistically significant effect** on HRIS-enabled HR transformational management practices that meet strategic organizational objectives such as strategic planning, organizational development, knowledge management and change management, and HRM performance related to employee satisfaction, motivation, presence (obverse of absenteeism) and retention (obverse of turnover).

Analysis 15: A cumulative odds ordinal logistic regression with proportional odds was run to determine the effect of organization type on the belief that organization type significantly impacts HRIS-enabled human resources (HR) transformational management practices that meet strategic organizational objectives such as strategic planning, organizational development, knowledge management and change management, and HRM performance related to employee involvement, trust, loyalty, commitment and “social climate” between workers and management.

The results were analysed under three categories, namely test for multicollinearity, proportional odds (PLUM), model fit (PLUM and GENLIN) and test of model effects (GENLIN).

Test for multicollinearity:

Coefficients^a

Model		Collinearity Statistics	
		Tolerance	VIF
1	Private	.442	2.263
	Government	.509	1.964
	Semi_Government	.565	1.770

a. Dependent Variable: Q15 - HR-enabled Transformational-HR Performance (Transformational-Invole.Trust.Loyal.commit.)

Since all the Tolerance values are greater than 0.1 (the lowest is 0.442) and VIF values are much less than 10, therefore, **there is no problem with collinearity** in this particular data set.

Proportional Odds

The assumption of proportional odds is fundamental to the particular type of (cumulative) ordinal logistic regression model. This assumption means that each independent variable has an identical effect at each cumulative split of the ordinal dependent variable.

- This assumption can be tested formally using the statistical test that is generated when the test of parallel lines option in the **Ordinal Regression: Output** dialogue box is selected and the **Test of Parallel Lines** table is presented.

Test of Parallel Lines ^a				
Model	-2 Log Likelihood	Chi-Square	df	Sig.
Null Hypothesis	41.717			
General	36.799	4.918	9	.841

The null hypothesis states that the location parameters (slope coefficients) are the same across response categories.

a. Link function: Logit.

- This test works by comparing the model fit (the "**-2 Log Likelihood**" column) to the two different cumulative odds models.
- The two models that are compared are the proportional odds model (the "**Null Hypothesis**" row) and the cumulative odds model *without* the proportional odds constraint/assumption (the "**General**" row); *i.e.*, a model where the slope coefficients (relationship) are allowed to be different for each cumulative logit.
- If the assumption of proportional odds is met, one would expect the difference in model fit (the "**Chi-square**" column) between these two models to be small and not statistically significant ($p > .05$).
- Alternatively, if the assumption of proportional odds is violated, one would expect the difference in fit between these two models to be large and statistically significant ($p < .05$).
- The statistical significance level (p -value) of this test can be found in the "**Sig.**" column.
- In this analysis, $p = .841$, which is greater than .05 and, therefore, the assumption of proportional odds is met (*i.e.*, this assumption is valid).
- To report this result:

The assumption of proportional odds was met, as assessed by a full likelihood ratio test comparing the residual of the fitted location model to a model with varying location parameters, $\chi^2(9) = 4.918, p = .841$ (i.e. $p > 0.05$).

Model fit

1. Overall goodness-of-fit tests

SPSS generates two tests of the overall goodness-of-fit of the model (i.e., an overall measure of whether the model fits the data well). These are the Pearson and Deviance goodness-of-fit tests, as shown below in the **Goodness-of-Fit** table:

Goodness-of-Fit			
	Chi-Square	df	Sig.
Pearson	4.327	9	.889
Deviance	4.918	9	.841

Link function: Logit.

- Both the Pearson (the "**Pearson Chi-Square**" row) and deviance (the "**Deviance**" row) statistics are designed to provide a measure of how poorly the model fits the data (or the variations in the model that cannot be explained).
- Because the test statistics measure how poor the model is, one is actually looking for these tests to be not statistically significant to indicate a good model fit (i.e., $p > .05$ in the "**Sig.**" column).
- Based on the analysis above, to report the result:
 - *The Pearson goodness-of-fit test indicated that the model was **a good fit** to the observed data, $\chi^2(9) = 4.327, p = .889$ (i.e., $p > .05$).*
 - *The Deviance goodness-of-fit test indicated that the model was **a good fit** to the observed data, $\chi^2(9) = 4.918, p = .841$ (i.e., $p > .05$).*

2. Likelihood-ratio test

A better method of assessing model fit is to look at the difference in model fit (in the PLUM analysis) when comparing the full model to the intercept-only model.

- The likelihood-ratio test is presented in the **Model Fitting Information** table, as shown below:

Model Fitting Information

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	46.269			
Final	41.717	4.552	3	.208

Link function: Logit.

- The model fit (the "**-2 Log Likelihood**" column) is 46.269 for the intercept-only model (the "**Intercept Only**" row) compared to the model with the intercept and all independent variables (the "**Final**" row), which has a -2 log likelihood of 41.717.
- The smaller the -2 log likelihood value, the better the fit. As such, the greater the difference between the two models, the better the independent variable is at explaining the dependent variable.
- The difference between the two -2 log likelihood values is presented in the "**Chi-Square**" column with 3 degrees of freedom ("**df**") and the statistical significance level (*p*-value) of this test can be found in the "**Sig.**" column.
- If the significance value was less than .05 (*i.e.*, $p < .05$), the independent variables would add to the prediction of the dependent variable. Since the significance value was greater than .05 (*i.e.*, $p > .05$), the independent variable does not add to the prediction of the dependent variable.
- In this analysis, the result can be stated as:

*According to the Model Fitting Information table obtained from PLUM analysis, the independent variable does not add to the prediction of the dependent variable; $\chi^2(3) = 4.552$, $p = .208$, (*i.e.*, $p > .05$).*

GENLIN parameter estimates: Tests of Model Effects (Polytomous variables)

The GENLIN procedure reports an overall test of significance for each variable entered into the logistic regression model in the **Tests of Model Effects** table given below:

Tests of Model Effects

Source	Type III		
	Wald Chi-Square	df	Sig.
org_type	4.428	3	.219

Dependent Variable: Q15 - HR-enabled
Transformational-HR Performance
(Transformational-Invole.Trust.Loyal.commit.)
Model: (Threshold), org_type

- The table above shows the omnibus test result for the org_type variable using the Wald test statistic.

- The hypothesis test value is presented in the "**Wald Chi-Square**" column with 3 degrees of freedom ("**df**") and the statistical significance level (*p*-value) of this test can be found in the "**Sig.**" column.
- If the significance value was less than .05 (*i.e.*, $p < .05$), the independent variable would add to the prediction of the dependent variable. Since the significance value was greater than .05 (*i.e.*, $p > .05$), the independent variable does not add to the prediction of the dependent variable.
- Therefore, the result can be stated as:

*The above table clearly states that the independent variable has no significant effect on the dependent variable; Wald $\chi^2 (3) = 4.428, p = .219$ (*i.e.*, $p > .05$).*

The result: Multicollinearity: **No**; Proportional odds: **Yes**, $\chi^2 (9) = 4.918, p = .841$ ($p > 0.05$); Pearson goodness-of-fit: **Yes**, $\chi^2 (9) = 4.327, p = .889$ (*i.e.*, $p > .05$); Deviance goodness-of-fit: **Yes**, $\chi^2 (9) = 4.918, p = .841$ (*i.e.*, $p > .05$); Likelihood-ratio test: **No**, $\chi^2 (3) = 4.552, p = .208$ (*i.e.* $p > .05$); Model Effects: **No**, Wald $\chi^2 (3) = 4.428, p = .219$ (*i.e.*, $p > .05$).

Discussion: Therefore, based on the analysis above, the conclusion here is that despite the fact that the model pass the multicollinearity test and meets the proportional odds and goodness of fit requirements, the two decisive factors of this analysis, the likelihood-ratio test and the tests of model effects suggest that the organization type **has no statistically significant effect** on HRIS-enabled HR transformational management practices that meet strategic organizational objectives such as strategic planning, organizational development, knowledge management and change management, and HRM performance employee involvement, trust, loyalty, commitment and “social climate” between workers and management.

Table 10.3 - Results: Impact of organization type on HRIS-enabled HR performance

Analysis	Multicollinearity	Proportional Odds			Goodness-of-fit tests						Likelihood-ratio			Tests of Model Effects		
					Pearson			Deviance								
		Chi-Square (χ^2)	<i>P</i> - value	Met?	Chi-Square (χ^2)	<i>P</i> - value	Fit?	Chi-Square (χ^2)	<i>P</i> - value	Fit?	Chi-Square (χ^2)	<i>P</i> - value	Sig. Effect?	Wald Chi-Square (χ^2)	<i>P</i> - value	Sig. Effect ?
6	No	5.938	.746	Yes <i>P</i> >.05	4.640	.864	Yes <i>P</i> >.05	5.938	.746	Yes <i>P</i> >.05	5.717	.126	No <i>P</i> >.05	5.482	.140	No <i>P</i> >.05
7	No	7.429	.593	Yes <i>P</i> >.05	5.903	.750	Yes <i>P</i> >.05	7.429	.593	Yes <i>P</i> >.05	3.265	.353	No <i>P</i> >.05	3.302	.347	No <i>P</i> >.05
8	No	31.518	.000	No <i>P</i> <.05	17.604	.040	No <i>P</i> <.05	17.648	.039	No <i>P</i> <.05	.778	.855	No <i>P</i> >.05	.788	.852	No <i>P</i> >.05
9	No	13.080	.159	Yes <i>P</i> >.05	10.932	.280	Yes <i>P</i> >.05	13.080	.159	Yes <i>P</i> >.05	.741	.863	No <i>P</i> >.05	.772	.856	No <i>P</i> >.05
10	No	6.841	.654	Yes <i>P</i> >.05	6.633	.675	Yes <i>P</i> >.05	6.841	.654	Yes <i>P</i> >.05	3.353	.340	No <i>P</i> >.05	3.351	.341	No <i>P</i> >.05
11	No	23.640	.005	No <i>P</i> =.05	11.560	.239	Yes <i>P</i> >.05	10.470	.314	Yes <i>P</i> >.05	4.582	.205	No <i>P</i> >.05	4.386	.223	No <i>P</i> >.05
12	No	5.673	.461	Yes <i>P</i> >.05	5.725	.455	Yes <i>P</i> >.05	5.673	.461	Yes <i>P</i> >.05	7.681	.053	No <i>P</i> >.05	7.099	.069	No <i>P</i> >.05
13	No	7.857	.549	Yes <i>P</i> >.05	7.511	.584	Yes <i>P</i> >.05	7.857	.549	Yes <i>P</i> >.05	4.916	.178	No <i>P</i> >.05	4.713	.194	No <i>P</i> >.05
14	No	7.522	.583	Yes <i>P</i> >.05	6.683	.670	Yes <i>P</i> >.05	7.522	.583	Yes <i>P</i> >.05	3.462	.326	No <i>P</i> >.05	3.416	.332	No <i>P</i> >.05
15	No	4.918	.841	Yes <i>P</i> >.05	4.327	.889	Yes <i>P</i> >.05	4.918	.841	Yes <i>P</i> >.05	4.552	.208	No <i>P</i> >.05	4.428	.219	No <i>P</i> >.05

10.3 Impact of organization size on HRIS-enabled HR practices and HRM performance: Ordinal logistic regression (OLR)

The analyses in this section are based on the following hypothesis:

Null Hypothesis 5 (H5₀): Organization size does not significantly impact the HRIS-enabled HRM performance model.

Hypothesis 5 (H5): Organization size significantly impacts the HRIS-enabled HRM performance model.

10.3.1 Section 1 - Organization size vs. HRIS-enabled HR practices results and discussion

Table 10.4 depicts the summary of the ordinal regression analyses that the researcher carried out to determine if there is any impact of organization size on HRIS-enabled HR practices.

IMPORTANT NOTE: Please note that the ordinal logistic regression (OLR) analyses below are based on the tutorial lessons that the researcher took from Laerd Statistics (2015). The templates used here to analyse the answers are, therefore, directly quoted with the permission from Laerd Statistics.

Analysis 1: A cumulative odds ordinal logistic regression with proportional odds was run to determine the effect of organization size on the belief that organization size significantly impacts HRIS-enabled day-to-day human resources (HR) transactional record keeping practices such as, entering payroll information, employee status changes, etc.

The results were analysed under three categories, namely test for multicollinearity, proportional odds (PLUM), model fit (PLUM and GENLIN) and test of model effects (GENLIN).

Test for multicollinearity:

Coefficients ^a			
Model		Collinearity Statistics	
		Tolerance	VIF
1	Less_than_500	.583	1.716
	Between_500_and_5000	.583	1.716

a. Dependent Variable: Q1 - HRIS-Transactional (Day2Day)

Since all the Tolerance values are greater than 0.1 (the lowest is 0.583) and VIF values are much less than 10, therefore, **there is no problem with collinearity** in this particular data set.

Proportional Odds

The assumption of proportional odds is fundamental to the particular type of (cumulative) ordinal logistic regression model. This assumption means that each independent variable has an identical effect at each cumulative split of the ordinal dependent variable.

- This assumption can be tested formally using the statistical test that is generated when the test of parallel lines option in the **Ordinal Regression: Output** dialogue box is selected and the **Test of Parallel Lines** table is presented.

Test of Parallel Lines^a

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Null Hypothesis	35.579			
General	25.639	9.939	6	.127

The null hypothesis states that the location parameters (slope coefficients) are the same across response categories.

a. Link function: Logit.

- This test works by comparing the model fit (the "**-2 Log Likelihood**" column) to the two different cumulative odds models.
- The two models that are compared are the proportional odds model (the "**Null Hypothesis**" row) and the cumulative odds model *without* the proportional odds constraint/assumption (the "**General**" row); *i.e.*, a model where the slope coefficients (relationship) are allowed to be different for each cumulative logit.
- If the assumption of proportional odds is met, one would expect the difference in model fit (the "**Chi-square**" column) between these two models to be small and not statistically significant ($p > .05$).
- Alternatively, if the assumption of proportional odds is violated, one would expect the difference in fit between these two models to be large and statistically significant ($p < .05$).
- The statistical significance level (p -value) of this test can be found in the "**Sig.**" column.
- In this analysis, $p = .127$, which is greater than .05 and, therefore, the assumption of proportional odds is met (*i.e.*, this assumption is valid).
- To report this result:

*The assumption of proportional odds was met, as assessed by a full likelihood ratio test comparing the residual of the fitted location model to a model with varying location parameters, $\chi^2(9) = 9.939$, $p = .127$ (*i.e.* $p > 0.05$).*

Model fit

1. Overall goodness-of-fit tests

SPSS generates two tests of the overall goodness-of-fit of the model (*i.e.*, an overall measure of whether the model fits the data well). These are the Pearson and Deviance goodness-of-fit tests, as shown below in the **Goodness-of-Fit** table:

Goodness-of-Fit			
	Chi-Square	df	Sig.
Pearson	6.719	6	.348
Deviance	5.719	6	.455

Link function: Logit.

- Both the Pearson (the "**Pearson Chi-Square**" row) and deviance (the "**Deviance**" row) statistics are designed to provide a measure of how poorly the model fits the data (or the variations in the model that cannot be explained).
- Because the test statistics measure how poor the model is, one is actually looking for these tests to be not statistically significant to indicate a good model fit (*i.e.*, $p > .05$ in the "**Sig.**" column).
- Based on the analysis above, to report the result:
 - *The Pearson goodness-of-fit test indicated that the model was **a good fit** to the observed data, $\chi^2(9) = 6.719, p = .348$ (*i.e.*, $p > .05$).*
 - *The Deviance goodness-of-fit test indicated that the model was **a good fit** to the observed data, $\chi^2(9) = 5.719, p = .455$ (*i.e.*, $p > .05$).*

2. Likelihood-ratio test

A better method of assessing model fit is to look at the difference in model fit (in the PLUM analysis) when comparing the full model to the intercept-only model.

- The likelihood-ratio test is presented in the **Model Fitting Information** table, as shown below:

Model Fitting Information				
Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	35.861			
Final	35.579	.282	2	.868

Link function: Logit.

- The model fit (the "**-2 Log Likelihood**" column) is 35.861 for the intercept-only model (the "**Intercept Only**" row) compared to the model with the intercept and all independent variables (the "**Final**" row), which has a -2 log likelihood of 35.579.
- The smaller the -2 log likelihood value, the better the fit. As such, the greater the difference between the two models, the better the independent variable is at explaining the dependent variable.
- The difference between the two -2 log likelihood values is presented in the "**Chi-Square**" column with 3 degrees of freedom ("**df**") and the statistical significance level (*p*-value) of this test can be found in the "**Sig.**" column.
- If the significance value was less than .05 (*i.e.*, $p < .05$), the independent variables would add to the prediction of the dependent variable. Since the significance value was greater than .05 (*i.e.*, $p > .05$), the independent variable does not add to the prediction of the dependent variable.
- In this analysis, the result can be stated as:

*According to the Model Fitting Information table obtained from PLUM analysis, the independent variable does not add to the prediction of the dependent variable; $\chi^2(3) = .282, p = .868$, (*i.e.*, $p > .05$).*

GENLIN parameter estimates: Tests of Model Effects (Polytomous variables)

The GENLIN procedure reports an overall test of significance for each variable entered into the logistic regression model in the **Tests of Model Effects** table given below:

Tests of Model Effects			
Source	Type III		
	Wald Chi-Square	df	Sig.
org_size	.292	2	.864

Dependent Variable: Q1 - HRIS-Transactional (Day2Day)
Model: (Threshold), org_size

- The table above shows the omnibus test result for the org_size variable using the Wald test statistic.
- The hypothesis test value is presented in the "**Wald Chi-Square**" column with 3 degrees of freedom ("**df**") and the statistical significance level (*p*-value) of this test can be found in the "**Sig.**" column.
- If the significance value was less than .05 (*i.e.*, $p < .05$), the independent variable would add to the prediction of the dependent variable. Since the significance value was greater

than .05 (*i.e.*, $p > .05$), the independent variable does not add to the prediction of the dependent variable.

- Therefore, the result can be stated as:

*The above table clearly states that the independent variable has no significant effect on the dependent variable; Wald $\chi^2 (3) = .292$, $p = .864$ (*i.e.*, $p > .05$).*

The result: Multicollinearity: **No**; Proportional odds: **Yes**, $\chi^2 (6) = 9.939$, $p = .127$ ($p > 0.05$); Pearson goodness-of-fit: **Yes**, $\chi^2 (6) = 6.719$, $p = .348$ (*i.e.*, $p > .05$); Deviance goodness-of-fit: **Yes**, $\chi^2 (6) = 5.719$, $p = .455$ (*i.e.*, $p > .05$); Likelihood-ratio test: **No**, $\chi^2 (2) = 0.282$, $p = .868$ (*i.e.* $p > .05$); Model Effects: **No**, Wald $\chi^2 (2) = .292$, $p = .864$ (*i.e.*, $p > .05$).

Discussion: Therefore, based on the analysis above, the conclusion here is that despite the fact that the model pass the multicollinearity test and meets the proportional odds and goodness of fit requirements, the two decisive factors of this analysis, the likelihood-ratio test and the tests of model effects suggest that the organization size **has no statistically significant effect** on HRIS-enabled day-to-day HR transactional record keeping practices such as, entering payroll information, employee status changes, *etc.*

Analysis 2: A cumulative odds ordinal logistic regression with proportional odds was run to determine the effect of organization size on the belief that organization size significantly impacts HRIS-enabled human resources (HR) transactional employee benefits administration practices such as overseeing the health insurance coverage, administering investment and retirement program, *etc.*

The results were analysed under three categories, namely test for multicollinearity, proportional odds (PLUM), model fit (PLUM and GENLIN) and test of model effects (GENLIN).

Test for multicollinearity:

Coefficients^a

		Collinearity Statistics	
		Tolerance	VIF
1	Less_than_500	.583	1.716
	Between_500_and_5000	.583	1.716

a. Dependent Variable: Q2 - HRIS-Transactional
(Benefit Admin)

Since all the Tolerance values are greater than 0.1 (the lowest is 0.583) and VIF values are much less than 10, therefore, **there is no problem with collinearity** in this particular data set.

Proportional Odds

The assumption of proportional odds is fundamental to the particular type of (cumulative) ordinal logistic regression model. This assumption means that each independent variable has an identical effect at each cumulative split of the ordinal dependent variable.

- This assumption can be tested formally using the statistical test that is generated when the test of parallel lines option in the **Ordinal Regression: Output** dialogue box is selected and the **Test of Parallel Lines** table is presented.

Test of Parallel Lines^a

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Null Hypothesis	40.584			
General	33.891	6.694	6	.350

The null hypothesis states that the location parameters (slope coefficients) are the same across response categories.

a. Link function: Logit.

- This test works by comparing the model fit (the "**-2 Log Likelihood**" column) to the two different cumulative odds models.
- The two models that are compared are the proportional odds model (the "**Null Hypothesis**" row) and the cumulative odds model *without* the proportional odds constraint/assumption (the "**General**" row); *i.e.*, a model where the slope coefficients (relationship) are allowed to be different for each cumulative logit.
- If the assumption of proportional odds is met, one would expect the difference in model fit (the "**Chi-square**" column) between these two models to be small and not statistically significant ($p > .05$).
- Alternatively, if the assumption of proportional odds is violated, one would expect the difference in fit between these two models to be large and statistically significant ($p < .05$).
- The statistical significance level (p -value) of this test can be found in the "**Sig.**" column.
- In this analysis, $p = .350$, which is greater than .05 and, therefore, the assumption of proportional odds is met (*i.e.*, this assumption is valid).
- To report this result:

The assumption of proportional odds was met, as assessed by a full likelihood ratio test comparing the residual of the fitted location model to a model with varying location parameters, $\chi^2(9) = 6.694$, $p = .350$ (i.e. $p > 0.05$).

Model fit

1. Overall goodness-of-fit tests

SPSS generates two tests of the overall goodness-of-fit of the model (i.e., an overall measure of whether the model fits the data well). These are the Pearson and Deviance goodness-of-fit tests, as shown below in the **Goodness-of-Fit** table:

Goodness-of-Fit			
	Chi-Square	df	Sig.
Pearson	7.305	6	.294
Deviance	6.694	6	.350

Link function: Logit.

- Both the Pearson (the "**Pearson Chi-Square**" row) and deviance (the "**Deviance**" row) statistics are designed to provide a measure of how poorly the model fits the data (or the variations in the model that cannot be explained).
- Because the test statistics measure how poor the model is, one is actually looking for these tests to be not statistically significant to indicate a good model fit (i.e., $p > .05$ in the "**Sig.**" column).
- Based on the analysis above, to report the result:
 - *The Pearson goodness-of-fit test indicated that the model was **a good fit** to the observed data, $\chi^2(9) = 7.305$, $p = .294$ (i.e., $p > .05$).*
 - *The Deviance goodness-of-fit test indicated that the model was **a good fit** to the observed data, $\chi^2(9) = 6.694$, $p = .350$ (i.e., $p > .05$).*

2. Likelihood-ratio test

A better method of assessing model fit is to look at the difference in model fit (in the PLUM analysis) when comparing the full model to the intercept-only model.

- The likelihood-ratio test is presented in the **Model Fitting Information** table, as shown below:

Model Fitting Information

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	47.382			
Final	40.584	6.798	2	.033

Link function: Logit.

- The model fit (the "**-2 Log Likelihood**" column) is 47.382 for the intercept-only model (the "**Intercept Only**" row) compared to the model with the intercept and all independent variables (the "**Final**" row), which has a -2 log likelihood of 40.584.
- The smaller the -2 log likelihood value, the better the fit. As such, the greater the difference between the two models, the better the independent variable is at explaining the dependent variable.
- The difference between the two -2 log likelihood values is presented in the "**Chi-Square**" column with 3 degrees of freedom ("**df**") and the statistical significance level (*p*-value) of this test can be found in the "**Sig.**" column.
- If the significance value was less than .05 (*i.e.*, $p < .05$), the independent variables would add to the prediction of the dependent variable. Since the significance value was less than .05 (*i.e.*, $p < .05$), the independent variable does add to the prediction of the dependent variable.
- In this analysis, the result can be stated as:

*According to the Model Fitting Information table obtained from PLUM analysis, the independent variable does add to the prediction of the dependent variable; $\chi^2(3) = 6.798, p = .033$, (*i.e.*, $p < .05$).*

GENLIN parameter estimates: Tests of Model Effects (Polytomous variables)

The GENLIN procedure reports an overall test of significance for each variable entered into the logistic regression model in the **Tests of Model Effects** table given below:

Tests of Model Effects

Source	Type III		
	Wald Chi-Square	df	Sig.
org_size	6.584	2	.037

Dependent Variable: Q2 - HRIS-Transactional
(Benefit Admin)
Model: (Threshold), org_size

- The table above shows the omnibus test result for the org_size variable using the Wald test statistic.

- The hypothesis test value is presented in the "**Wald Chi-Square**" column with 3 degrees of freedom ("**df**") and the statistical significance level (*p*-value) of this test can be found in the "**Sig.**" column.
- If the significance value was less than .05 (*i.e.*, $p < .05$), the independent variable would add to the prediction of the dependent variable. Since the significance value was less than .05 (*i.e.*, $p < .05$), the independent variable does add to the prediction of the dependent variable.
- Therefore, the result can be stated as:

*The above table clearly states that the independent variable has significant effect on the dependent variable; Wald $\chi^2 (3) = 6.584$, $p = .037$ (*i.e.*, $p < .05$).*

The result: Multicollinearity: **No**; Proportional odds: **Yes**, $\chi^2 (6) = 6.694$, $p = .350$ ($p > 0.05$); Pearson goodness-of-fit: **Yes**, $\chi^2 (6) = 7.305$, $p = .294$ (*i.e.*, $p > .05$); Deviance goodness-of-fit: **Yes**, $\chi^2 (6) = 6.694$, $p = .350$ (*i.e.*, $p > .05$); Likelihood-ratio test: **Yes**, $\chi^2 (2) = 6.798$, $p = .033$ (*i.e.* $p < .05$); Model Effects: **Yes**, Wald $\chi^2 (2) = 6.584$, $p = .037$ (*i.e.*, $p < .05$).

Discussion: Therefore, based on the analysis above, the conclusion here is that the model passes the multicollinearity test and meets the proportional odds and goodness of fit requirements, and the two decisive factors of this analysis, the likelihood-ratio test and the tests of model effects suggest that the organization size **has statistically significant effect** on HRIS-enabled HR transactional employee benefits administration practices such as overseeing the health insurance coverage, administering investment and retirement program, *etc.*

Analysis 3: A cumulative odds ordinal logistic regression with proportional odds was run to determine the effect of organization size on the belief that organization size significantly impacts HRIS-enabled human resources (HR) traditional management practices related to employee recruitment, selection, training, promotion, and compensation.

The results were analysed under three categories, namely test for multicollinearity, proportional odds (PLUM), model fit (PLUM and GENLIN) and test of model effects (GENLIN).

Test for multicollinearity:

Coefficients ^a			
Model		Collinearity Statistics	
		Tolerance	VIF
1	Less_than_500	.583	1.716
	Between_500_and_5000	.583	1.716

a. Dependent Variable: Q3 - HRIS-Traditional (Rec.
Select.Train.Promo.Comp.etc.)

Since all the Tolerance values are greater than 0.1 (the lowest is 0.583) and VIF values are much less than 10, therefore, **there is no problem with collinearity** in this particular data set.

Proportional Odds

The assumption of proportional odds is fundamental to the particular type of (cumulative) ordinal logistic regression model. This assumption means that each independent variable has an identical effect at each cumulative split of the ordinal dependent variable.

- This assumption can be tested formally using the statistical test that is generated when the test of parallel lines option in the **Ordinal Regression: Output** dialogue box is selected and the **Test of Parallel Lines** table is presented.

Test of Parallel Lines ^a				
Model	-2 Log Likelihood	Chi-Square	df	Sig.
Null Hypothesis	43.612			
General	22.838	20.774	6	.002

The null hypothesis states that the location parameters (slope coefficients) are the same across response categories.

a. Link function: Logit.

- This test works by comparing the model fit (the "**-2 Log Likelihood**" column) to the two different cumulative odds models.
- The two models that are compared are the proportional odds model (the "**Null Hypothesis**" row) and the cumulative odds model *without* the proportional odds constraint/assumption (the "**General**" row); *i.e.*, a model where the slope coefficients (relationship) are allowed to be different for each cumulative logit.
- If the assumption of proportional odds is met, one would expect the difference in model fit (the "**Chi-square**" column) between these two models to be small and not statistically significant ($p > .05$).

- Alternatively, if the assumption of proportional odds is violated, one would expect the difference in fit between these two models to be large and statistically significant ($p < .05$).
- The statistical significance level (p -value) of this test can be found in the "Sig." column.
- In this analysis, $p = .002$, which is less than .05 and, therefore, the assumption of proportional odds is not met (*i.e.*, this assumption is not valid).
- To report this result:

*The assumption of proportional odds was met, as assessed by a full likelihood ratio test comparing the residual of the fitted location model to a model with varying location parameters, $\chi^2 (9) = 20.774, p = .002$ (*i.e.* $p < 0.05$).*

Model fit

1. Overall goodness-of-fit tests

SPSS generates two tests of the overall goodness-of-fit of the model (*i.e.*, an overall measure of whether the model fits the data well). These are the Pearson and Deviance goodness-of-fit tests, as shown below in the **Goodness-of-Fit** table:

Goodness-of-Fit			
	Chi-Square	df	Sig.
Pearson	14.057	6	.029
Deviance	9.727	6	.137

Link function: Logit.

- Both the Pearson (the "**Pearson Chi-Square**" row) and deviance (the "**Deviance**" row) statistics are designed to provide a measure of how poorly the model fits the data (or the variations in the model that cannot be explained).
- Because the test statistics measure how poor the model is, one is actually looking for these tests to be not statistically significant to indicate a good model fit (*i.e.*, $p > .05$ in the "Sig." column).
- Based on the analysis above, to report the result:
 - *The Pearson goodness-of-fit test indicated that the model was **not a good fit** to the observed data, $\chi^2 (9) = 14.057, p = .029$ (*i.e.*, $p < .05$).*
 - *The Deviance goodness-of-fit test indicated that the model was **a good fit** to the observed data, $\chi^2 (9) = 9.727, p = .137$ (*i.e.*, $p > .05$).*

2. Likelihood-ratio test

A better method of assessing model fit is to look at the difference in model fit (in the PLUM analysis) when comparing the full model to the intercept-only model.

- The likelihood-ratio test is presented in the **Model Fitting Information** table, as shown below:

Model Fitting Information				
Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	46.251			
Final	43.612	2.639	2	.267

Link function: Logit.

- The model fit (the "**-2 Log Likelihood**" column) is 46.251 for the intercept-only model (the "**Intercept Only**" row) compared to the model with the intercept and all independent variables (the "**Final**" row), which has a -2 log likelihood of 43.612.
- The smaller the -2 log likelihood value, the better the fit. As such, the greater the difference between the two models, the better the independent variable is at explaining the dependent variable.
- The difference between the two -2 log likelihood values is presented in the "**Chi-Square**" column with 3 degrees of freedom ("**df**") and the statistical significance level (p -value) of this test can be found in the "**Sig.**" column.
- If the significance value was less than .05 (*i.e.*, $p < .05$), the independent variables would add to the prediction of the dependent variable. Since the significance value was greater than .05 (*i.e.*, $p > .05$), the independent variable does not add to the prediction of the dependent variable.
- In this analysis, the result can be stated as:

*According to the Model Fitting Information table obtained from PLUM analysis, the independent variable does not add to the prediction of the dependent variable; $\chi^2(3) = 2.639$, $p = .267$, (*i.e.*, $p > .05$).*

GENLIN parameter estimates: Tests of Model Effects (Polytomous variables)

The GENLIN procedure reports an overall test of significance for each variable entered into the logistic regression model in the **Tests of Model Effects** table given below:

Tests of Model Effects

Source	Type III		
	Wald Chi-Square	df	Sig.
org_size	2.634	2	.268

Dependent Variable: Q3 - HRIS-Traditional (Rec. Select.Train.Promo.Comp.etc.)

Model: (Threshold), org_size

- The table above shows the omnibus test result for the org_size variable using the Wald test statistic.
- The hypothesis test value is presented in the "**Wald Chi-Square**" column with 3 degrees of freedom ("**df**") and the statistical significance level (*p*-value) of this test can be found in the "**Sig.**" column.
- If the significance value was less than .05 (*i.e.*, $p < .05$), the independent variable would add to the prediction of the dependent variable. Since the significance value was greater than .05 (*i.e.*, $p > .05$), the independent variable does not add to the prediction of the dependent variable.
- Therefore, the result can be stated as:

*The above table clearly states that the independent variable has no significant effect on the dependent variable; Wald χ^2 (3) = 2.634, $p = .268$ (*i.e.*, $p > .05$).*

The result: Multicollinearity: **No**; Proportional odds: **No**, χ^2 (6) = 20.774, $p = .002$ ($p < 0.05$); Pearson goodness-of-fit: **No**, χ^2 (6) = 14.057, $p = .029$ (*i.e.*, $p > .05$); Deviance goodness-of-fit: **Yes**, χ^2 (6) = 9.727, $p = .137$ (*i.e.*, $p > .05$); Likelihood-ratio test: **No**, χ^2 (2) = 2.639, $p = .267$ (*i.e.* $p > .05$); Model Effects: **No**, Wald χ^2 (2) = 2.634, $p = .268$ (*i.e.*, $p > .05$).

Discussion: Therefore, based on the analysis above, the conclusion here is that despite the fact that the model pass the multicollinearity test and meets the Deviance goodness-of-fit, the model does not meet the proportional odds and Pearson goodness-of-fit requirements. The two decisive factors of this analysis, the likelihood-ratio test and the tests of model effects suggest that the organization size **has no statistically significant effect** on HRIS-enabled HR traditional management practices related to employee recruitment, selection, training, promotion, and compensation.

Analysis 4: A cumulative odds ordinal logistic regression with proportional odds was run to determine the effect of organization size on the belief that organization size significantly impacts HRIS-enabled human resources (HR) traditional management practices related to employee performance management, rewards, career development and communication (employee relations).

The results were analysed under three categories, namely test for multicollinearity, proportional odds (PLUM), model fit (PLUM and GENLIN) and test of model effects (GENLIN).

Test for multicollinearity:

Coefficients^a

Model		Collinearity Statistics	
		Tolerance	VIF
1	Less_than_500	.583	1.716
	Between_500_and_5000	.583	1.716

a. Dependent Variable: Q4 - HRIS-Traditional
(Peform_Mgmt.Reward.Career_Dev.etc.)

Since all the Tolerance values are greater than 0.1 (the lowest is 0.583) and VIF values are much less than 10, therefore, **there is no problem with collinearity** in this particular data set.

Proportional Odds

The assumption of proportional odds is fundamental to the particular type of (cumulative) ordinal logistic regression model. This assumption means that each independent variable has an identical effect at each cumulative split of the ordinal dependent variable.

- This assumption can be tested formally using the statistical test that is generated when the test of parallel lines option in the **Ordinal Regression: Output** dialogue box is selected and the **Test of Parallel Lines** table is presented.

Test of Parallel Lines^a

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Null Hypothesis	43.500			
General	35.367	8.134	6	.228

The null hypothesis states that the location parameters (slope coefficients) are the same across response categories.

a. Link function: Logit.

- This test works by comparing the model fit (the "**-2 Log Likelihood**" column) to the two different cumulative odds models.

- The two models that are compared are the proportional odds model (the "**Null Hypothesis**" row) and the cumulative odds model *without* the proportional odds constraint/assumption (the "**General**" row); *i.e.*, a model where the slope coefficients (relationship) are allowed to be different for each cumulative logit.
- If the assumption of proportional odds is met, one would expect the difference in model fit (the "**Chi-square**" column) between these two models to be small and not statistically significant ($p > .05$).
- Alternatively, if the assumption of proportional odds is violated, one would expect the difference in fit between these two models to be large and statistically significant ($p < .05$).
- The statistical significance level (p -value) of this test can be found in the "**Sig.**" column.
- In this analysis, $p = .228$, which is greater than .05 and, therefore, the assumption of proportional odds is met (*i.e.*, this assumption is valid).
- To report this result:

*The assumption of proportional odds was met, as assessed by a full likelihood ratio test comparing the residual of the fitted location model to a model with varying location parameters, $\chi^2 (9) = 8.134$, $p = .228$ (*i.e.* $p > 0.05$).*

Model fit

1. Overall goodness-of-fit tests

SPSS generates two tests of the overall goodness-of-fit of the model (*i.e.*, an overall measure of whether the model fits the data well). These are the Pearson and Deviance goodness-of-fit tests, as shown below in the **Goodness-of-Fit** table:

Goodness-of-Fit			
	Chi-Square	df	Sig.
Pearson	8.736	6	.189
Deviance	8.134	6	.228

Link function: Logit.

- Both the Pearson (the "**Pearson Chi-Square**" row) and deviance (the "**Deviance**" row) statistics are designed to provide a measure of how poorly the model fits the data (or the variations in the model that cannot be explained).
- Because the test statistics measure how poor the model is, one is actually looking for these tests to be not statistically significant to indicate a good model fit (*i.e.*, $p > .05$ in the "**Sig.**" column).

- Based on the analysis above, to report the result:
 - *The Pearson goodness-of-fit test indicated that the model was **a good fit** to the observed data, $\chi^2 (9) = 8.736, p = .189$ (i.e., $p > .05$).*
 - *The Deviance goodness-of-fit test indicated that the model was **a good fit** to the observed data, $\chi^2 (9) = 8.134, p = .228$ (i.e., $p > .05$).*

2. Likelihood-ratio test

A better method of assessing model fit is to look at the difference in model fit (in the PLUM analysis) when comparing the full model to the intercept-only model.

- The likelihood-ratio test is presented in the **Model Fitting Information** table, as shown below:

Model Fitting Information				
Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	46.051			
Final	43.500	2.550	2	.279

Link function: Logit.

- The model fit (the "**-2 Log Likelihood**" column) is 46.051 for the intercept-only model (the "**Intercept Only**" row) compared to the model with the intercept and all independent variables (the "**Final**" row), which has a -2 log likelihood of 43.500.
- The smaller the -2 log likelihood value, the better the fit. As such, the greater the difference between the two models, the better the independent variable is at explaining the dependent variable.
- The difference between the two -2 log likelihood values is presented in the "**Chi-Square**" column with 3 degrees of freedom ("**df**") and the statistical significance level (p -value) of this test can be found in the "**Sig.**" column.
- If the significance value was less than .05 (i.e., $p < .05$), the independent variables would add to the prediction of the dependent variable. Since the significance value was greater than .05 (i.e., $p > .05$), the independent variable does not add to the prediction of the dependent variable.
- In this analysis, the result can be stated as:

According to the Model Fitting Information table obtained from PLUM analysis, the independent variable does not add to the prediction of the dependent variable; $\chi^2 (3) = 2.550, p = .279$, (i.e., $p > .05$).

GENLIN parameter estimates: Tests of Model Effects (Polytomous variables)

The GENLIN procedure reports an overall test of significance for each variable entered into the logistic regression model in the **Tests of Model Effects** table given below:

Tests of Model Effects			
Source	Type III		
	Wald Chi-Square	df	Sig.
org_size	2.479	2	.290

Dependent Variable: Q4 - HRIS-Traditional
(Perform_Mgmt.Reward.Career_Dev.etc.)
Model: (Threshold), org_size

- The table above shows the omnibus test result for the org_size variable using the Wald test statistic.
- The hypothesis test value is presented in the "**Wald Chi-Square**" column with 3 degrees of freedom ("**df**") and the statistical significance level (*p*-value) of this test can be found in the "**Sig.**" column.
- If the significance value was less than .05 (*i.e.*, $p < .05$), the independent variable would add to the prediction of the dependent variable. Since the significance value was greater than .05 (*i.e.*, $p > .05$), the independent variable does not add to the prediction of the dependent variable.
- Therefore, the result can be stated as:

*The above table clearly states that the independent variable has no significant effect on the dependent variable; Wald χ^2 (3) = 2.479, $p = .290$ (*i.e.*, $p > .05$).*

The result: Multicollinearity: **No**; Proportional odds: **Yes**, χ^2 (6) = 8.134, $p = .228$ ($p > 0.05$); Pearson goodness-of-fit: **Yes**, χ^2 (6) = 8.736, $p = .189$ (*i.e.*, $p > .05$); Deviance goodness-of-fit: **Yes**, χ^2 (6) = 8.134, $p = .228$ (*i.e.*, $p > .05$); Likelihood-ratio test: **No**, χ^2 (2) = 2.550, $p = .279$ (*i.e.* $p > .05$); Model Effects: **No**, Wald χ^2 (2) = 2.479, $p = .290$ (*i.e.*, $p > .05$).

Discussion: Therefore, based on the analysis above, the conclusion here is that despite the fact that the model pass the multicollinearity test and meets the proportional odds and goodness of fit requirements, the two decisive factors of this analysis, the likelihood-ratio test and the tests of model effects suggest that the organization size **has no statistically significant effect** on HRIS-enabled HR traditional management practices related to employee performance management, rewards, career development and communication (employee relations).

Analysis 5: A cumulative odds ordinal logistic regression with proportional odds was run to determine the effect of organization size on the belief that organization size significantly impacts HRIS-enabled human resources (HR) transformational management practices that meet strategic organizational objectives such as strategic planning, organizational development, knowledge management and change management.

The results were analysed under three categories, namely test for multicollinearity, proportional odds (PLUM), model fit (PLUM and GENLIN) and test of model effects (GENLIN).

Test for multicollinearity:

Coefficients^a

Model		Collinearity Statistics	
		Tolerance	VIF
1	Less_than_500	.583	1.716
	Between_500_and_5000	.583	1.716

a. Dependent Variable: Q5 - HRIS-Transformational
(Strategic_Plan.Org_Dev.Know_Mgmt.
Change_Mgmt.)

Since all the Tolerance values are greater than 0.1 (the lowest is 0.583) and VIF values are much less than 10, therefore, **there is no problem with collinearity** in this particular data set.

Proportional Odds

The assumption of proportional odds is fundamental to the particular type of (cumulative) ordinal logistic regression model. This assumption means that each independent variable has an identical effect at each cumulative split of the ordinal dependent variable.

- This assumption can be tested formally using the statistical test that is generated when the test of parallel lines option in the **Ordinal Regression: Output** dialogue box is selected and the **Test of Parallel Lines** table is presented.

Test of Parallel Lines^a

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Null Hypothesis	42.287			
General	35.159	7.129	6	.309

The null hypothesis states that the location parameters (slope coefficients) are the same across response categories.

a. Link function: Logit.

- This test works by comparing the model fit (the "**-2 Log Likelihood**" column) to the two different cumulative odds models.

- The two models that are compared are the proportional odds model (the "**Null Hypothesis**" row) and the cumulative odds model *without* the proportional odds constraint/assumption (the "**General**" row); *i.e.*, a model where the slope coefficients (relationship) are allowed to be different for each cumulative logit.
- If the assumption of proportional odds is met, one would expect the difference in model fit (the "**Chi-square**" column) between these two models to be small and not statistically significant ($p > .05$).
- Alternatively, if the assumption of proportional odds is violated, one would expect the difference in fit between these two models to be large and statistically significant ($p < .05$).
- The statistical significance level (p -value) of this test can be found in the "**Sig.**" column.
- In this analysis, $p = .309$, which is greater than .05 and, therefore, the assumption of proportional odds is met (*i.e.*, this assumption is valid).
- To report this result:

*The assumption of proportional odds was met, as assessed by a full likelihood ratio test comparing the residual of the fitted location model to a model with varying location parameters, $\chi^2 (9) = 7.129$, $p = .309$ (*i.e.* $p > 0.05$).*

Model fit

1. Overall goodness-of-fit tests

SPSS generates two tests of the overall goodness-of-fit of the model (*i.e.*, an overall measure of whether the model fits the data well). These are the Pearson and Deviance goodness-of-fit tests, as shown below in the **Goodness-of-Fit** table:

Goodness-of-Fit			
	Chi-Square	df	Sig.
Pearson	6.703	6	.349
Deviance	7.129	6	.309

Link function: Logit.

- Both the Pearson (the "**Pearson Chi-Square**" row) and deviance (the "**Deviance**" row) statistics are designed to provide a measure of how poorly the model fits the data (or the variations in the model that cannot be explained).
- Because the test statistics measure how poor the model is, one is actually looking for these tests to be not statistically significant to indicate a good model fit (*i.e.*, $p > .05$ in the "**Sig.**" column).

- Based on the analysis above, to report the result:
 - *The Pearson goodness-of-fit test indicated that the model was **a good fit** to the observed data, $\chi^2 (9) = 6.703, p = .349$ (i.e., $p > .05$).*
 - *The Deviance goodness-of-fit test indicated that the model was **a good fit** to the observed data, $\chi^2 (9) = 7.129, p = .309$ (i.e., $p > .05$).*

2. Likelihood-ratio test

A better method of assessing model fit is to look at the difference in model fit (in the PLUM analysis) when comparing the full model to the intercept-only model.

- The likelihood-ratio test is presented in the **Model Fitting Information** table, as shown below:

Model Fitting Information				
Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	43.273			
Final	42.287	.986	2	.611

Link function: Logit.

- The model fit (the "**-2 Log Likelihood**" column) is 43.273 for the intercept-only model (the "**Intercept Only**" row) compared to the model with the intercept and all independent variables (the "**Final**" row), which has a -2 log likelihood of 42.287.
- The smaller the -2 log likelihood value, the better the fit. As such, the greater the difference between the two models, the better the independent variable is at explaining the dependent variable.
- The difference between the two -2 log likelihood values is presented in the "**Chi-Square**" column with 3 degrees of freedom ("**df**") and the statistical significance level (p -value) of this test can be found in the "**Sig.**" column.
- If the significance value was less than .05 (i.e., $p < .05$), the independent variables would add to the prediction of the dependent variable. Since the significance value was greater than .05 (i.e., $p > .05$), the independent variable does not add to the prediction of the dependent variable.
- In this analysis, the result can be stated as:

According to the Model Fitting Information table obtained from PLUM analysis, the independent variable does not add to the prediction of the dependent variable; $\chi^2 (3) = .986, p = .611$, (i.e., $p > .05$).

GENLIN parameter estimates: Tests of Model Effects (Polytomous variables)

The GENLIN procedure reports an overall test of significance for each variable entered into the logistic regression model in the **Tests of Model Effects** table given below:

Tests of Model Effects			
Source	Type III		
	Wald Chi-Square	df	Sig.
org_size	.978	2	.613

Dependent Variable: Q5 - HRIS-Transformational
(Strategic_Plan.Org_Dev.Know_Mgmt.
Change_Mgmt.)
Model: (Threshold), org_size

- The table above shows the omnibus test result for the org_size variable using the Wald test statistic.
- The hypothesis test value is presented in the "**Wald Chi-Square**" column with 3 degrees of freedom ("**df**") and the statistical significance level (*p*-value) of this test can be found in the "**Sig.**" column.
- If the significance value was less than .05 (*i.e.*, $p < .05$), the independent variable would add to the prediction of the dependent variable. Since the significance value was greater than .05 (*i.e.*, $p > .05$), the independent variable does not add to the prediction of the dependent variable.
- Therefore, the result can be stated as:

*The above table clearly states that the independent variable has no significant effect on the dependent variable; Wald $\chi^2(3) = .978, p = .613$ (*i.e.*, $p > .05$).*

The result: Multicollinearity: **No**; Proportional odds: **Yes**, $\chi^2(6) = 7.129, p = .309$ ($p > 0.05$); Pearson goodness-of-fit: **Yes**, $\chi^2(6) = 6.703, p = .349$ (*i.e.*, $p > .05$); Deviance goodness-of-fit: **Yes**, $\chi^2(6) = 7.129, p = .309$ (*i.e.*, $p > .05$); Likelihood-ratio test: **No**, $\chi^2(2) = 0.986, p = .611$ (*i.e.* $p > .05$); Model Effects: **No**, Wald $\chi^2(2) = 0.978, p = .613$ (*i.e.*, $p > .05$).

Discussion: Therefore, based on the analysis above, the conclusion here is that despite the fact that the model pass the multicollinearity test and meets the proportional odds and goodness of fit requirements, the two decisive factors of this analysis, the likelihood-ratio test and the tests of model effects suggest that the organization size **has no statistically significant effect** on HRIS-enabled HR transformational management practices that meet strategic organizational objectives such as strategic planning, organizational development, knowledge management and change management.

Table 10.4 - Results: Impact of organization type on HRIS-enabled HR performance

Analysis	Multicollinearity	Proportional Odds			Goodness-of-fit tests						Likelihood-ratio			Tests of Model Effects		
					Pearson			Deviance								
		Chi-Square (χ^2)	<i>P</i> - value	Met?	Chi-Square (χ^2)	<i>P</i> - value	Fit?	Chi-Square (χ^2)	<i>P</i> - value	Fit?	Chi-Square (χ^2)	<i>P</i> - value	Sig. Effect?	Wald Chi-Square (χ^2)	<i>P</i> - value	Sig. Effect?
1	No	9.939	.127	Yes <i>P</i> >.05	6.719	.348	Yes <i>P</i> >.05	5.719	.455	Yes <i>P</i> >.05	0.282	.868	No <i>P</i> >.05	0.292	.864	No <i>P</i> >.05
2	No	6.694	.350	Yes <i>P</i> >.05	7.305	.294	Yes <i>P</i> >.05	6.694	.350	Yes <i>P</i> >.05	6.798	.033	Yes <i>P</i> <.05	6.584	.037	Yes <i>P</i> <.05
3	No	20.774	.002	No <i>P</i> <.05	14.057	.029	No <i>P</i> <.05	9.727	.137	Yes <i>P</i> >.05	2.639	.267	No <i>P</i> >.05	2.634	.268	No <i>P</i> >.05
4	No	8.134	.228	Yes <i>P</i> >.05	8.736	.189	Yes <i>P</i> >.05	8.134	.228	Yes <i>P</i> >.05	2.550	.279	No <i>P</i> >.05	2.479	.290	No <i>P</i> >.05
5	No	7.129	.309	Yes <i>P</i> >.05	6.703	.349	Yes <i>P</i> >.05	7.129	3.09	Yes <i>P</i> >.05	0.986	.611	No <i>P</i> >.05	0.978	.613	No <i>P</i> >.05

10.3.2 Section 2 - Organization size Vs. HRIS-enabled HRM performance results and discussion

Table 10.5 depicts the summary of the ordinal regression analyses that the researcher carried out to determine if there is any impact of organization type on HRIS-enabled HR practices and HRM performance.

Analysis 6: A cumulative odds ordinal logistic regression with proportional odds was run to determine the effect of organization size on the belief that organization size significantly impacts HRIS-enabled day-to-day human resources (HR) transactional record keeping practices such as, entering payroll information, employee status changes, etc. and HRM performance related to employee satisfaction, motivation, presence (obverse of absenteeism) and retention (obverse of turnover).

The results were analysed under three categories, namely test for multicollinearity, proportional odds (PLUM), model fit (PLUM and GENLIN) and test of model effects (GENLIN).

Test for multicollinearity:

Coefficients ^a			
Model		Collinearity Statistics	
		Tolerance	VIF
1	Less_than_500	.583	1.716
	Between_500_and_5000	.583	1.716

a. Dependent Variable: Q6 - HR-enabled Transactional-HR Performance (Day2Day-Satis. Motivation.Presense.Retention)

Since all the Tolerance values are greater than 0.1 (the lowest is 0.583) and VIF values are much less than 10, therefore, **there is no problem with collinearity** in this particular data set.

Proportional Odds

The assumption of proportional odds is fundamental to the particular type of (cumulative) ordinal logistic regression model. This assumption means that each independent variable has an identical effect at each cumulative split of the ordinal dependent variable.

- This assumption can be tested formally using the statistical test that is generated when the test of parallel lines option in the **Ordinal Regression: Output** dialogue box is selected and the **Test of Parallel Lines** table is presented.

Test of Parallel Lines^a

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Null Hypothesis	40.873			
General	37.493	3.381	6	.760

The null hypothesis states that the location parameters (slope coefficients) are the same across response categories.

a. Link function: Logit.

- This test works by comparing the model fit (the "**-2 Log Likelihood**" column) to the two different cumulative odds models.
- The two models that are compared are the proportional odds model (the "**Null Hypothesis**" row) and the cumulative odds model *without* the proportional odds constraint/assumption (the "**General**" row); *i.e.*, a model where the slope coefficients (relationship) are allowed to be different for each cumulative logit.
- If the assumption of proportional odds is met, one would expect the difference in model fit (the "**Chi-square**" column) between these two models to be small and not statistically significant ($p > .05$).
- Alternatively, if the assumption of proportional odds is violated, one would expect the difference in fit between these two models to be large and statistically significant ($p < .05$).
- The statistical significance level (p -value) of this test can be found in the "**Sig.**" column.
- In this analysis, $p = .760$, which is greater than .05 and, therefore, the assumption of proportional odds is met (*i.e.*, this assumption is valid).
- To report this result:

*The assumption of proportional odds was met, as assessed by a full likelihood ratio test comparing the residual of the fitted location model to a model with varying location parameters, $\chi^2(6) = 3.381$, $p = .760$ (*i.e.* $p > 0.05$).*

Model fit

1. Overall goodness-of-fit tests

SPSS generates two tests of the overall goodness-of-fit of the model (*i.e.*, an overall measure of whether the model fits the data well). These are the Pearson and Deviance goodness-of-fit tests, as shown below in the **Goodness-of-Fit** table:

Goodness-of-Fit

	Chi-Square	df	Sig.
Pearson	4.351	6	.629
Deviance	3.381	6	.760

Link function: Logit.

- Both the Pearson (the "**Pearson Chi-Square**" row) and deviance (the "**Deviance**" row) statistics are designed to provide a measure of how poorly the model fits the data (or the variations in the model that cannot be explained).
- Because the test statistics measure how poor the model is, one is actually looking for these tests to be not statistically significant to indicate a good model fit (*i.e.*, $p > .05$ in the "**Sig.**" column).
- Based on the analysis above, to report the result:
 - *The Pearson goodness-of-fit test indicated that the model was **a good fit** to the observed data, $\chi^2(6) = 4.351, p = .629$ (*i.e.*, $p > .05$).*
 - *The Deviance goodness-of-fit test indicated that the model was **a good fit** to the observed data, $\chi^2(6) = 3.381, p = .760$ (*i.e.*, $p > .05$).*

2. Likelihood-ratio test

A better method of assessing model fit is to look at the difference in model fit (in the PLUM analysis) when comparing the full model to the intercept-only model.

- The likelihood-ratio test is presented in the **Model Fitting Information** table, as shown below:

Model Fitting Information

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	54.954			
Final	40.873	14.080	2	.001

Link function: Logit.

- The model fit (the "**-2 Log Likelihood**" column) is 54.954 for the intercept-only model (the "**Intercept Only**" row) compared to the model with the intercept and all independent variables (the "**Final**" row), which has a -2 log likelihood of 40.873.
- The smaller the -2 log likelihood value, the better the fit. As such, the greater the difference between the two models, the better the independent variable is at explaining the dependent variable.

- The difference between the two -2 log likelihood values is presented in the "**Chi-Square**" column with 3 degrees of freedom ("**df**") and the statistical significance level (p -value) of this test can be found in the "**Sig.**" column.
- If the significance value was less than .05 (*i.e.*, $p < .05$), the independent variables would add to the prediction of the dependent variable. Since the significance value was less than .05 (*i.e.*, $p < .05$), the independent variable does add to the prediction of the dependent variable.
- In this analysis, the result can be stated as:

*According to the Model Fitting Information table obtained from PLUM analysis, the independent variable does add to the prediction of the dependent variable; $\chi^2(2) = 14.080$, $p = .001$, (*i.e.*, $p < .05$).*

GENLIN parameter estimates: Tests of Model Effects (Polytomous variables)

The GENLIN procedure reports an overall test of significance for each variable entered into the logistic regression model in the **Tests of Model Effects** table given below:

Tests of Model Effects			
Source	Type III		
	Wald Chi-Square	df	Sig.
org_size	13.560	2	.001

Dependent Variable: Q6 - HR-enabled Transactional-HR Performance (Day2Day-Satis. Motivation.Presense.Retention)
Model: (Threshold), org_size

- The table above shows the omnibus test result for the org_size variable using the Wald test statistic.
- The hypothesis test value is presented in the "**Wald Chi-Square**" column with 3 degrees of freedom ("**df**") and the statistical significance level (p -value) of this test can be found in the "**Sig.**" column.
- If the significance value was less than .05 (*i.e.*, $p < .05$), the independent variable would add to the prediction of the dependent variable. Since the significance value was less than .05 (*i.e.*, $p < .05$), the independent variable does not add to the prediction of the dependent variable.
- Therefore, the result can be stated as:

*The above table clearly states that the independent variable has significant effect on the dependent variable; Wald $\chi^2(2) = 13.560$, $p = .001$ (*i.e.*, $p < .05$).*

The result: Multicollinearity: **No**; Proportional odds: **Yes**, $\chi^2 (6) = 3.381, p = .760$ ($p > 0.05$); Pearson goodness-of-fit: **Yes**, $\chi^2 (6) = 4.351, p = .629$ (*i.e.*, $p > .05$); Deviance goodness-of-fit: **Yes**, $\chi^2 (6) = 3.381, p = .760$ (*i.e.*, $p > .05$); Likelihood-ratio test: **Yes**, $\chi^2 (2) = 14.080, p = .001$ (*i.e.* $p < .05$); Model Effects: **Yes**, Wald $\chi^2 (2) = 13.560, p = .001$ (*i.e.*, $p < .05$).

Discussion: Therefore, based on the analysis above, the conclusion here is that the model passes the multicollinearity test and meets the proportional odds and goodness of fit requirements, and the two decisive factors of this analysis, the likelihood-ratio test and the tests of model effects suggest that the organization size **has statistically significant effect** on HRIS-enabled day-to-day HR transactional record keeping practices such as, entering payroll information, employee status changes, *etc.* and HRM performance related to employee satisfaction, motivation, presence (obverse of absenteeism) and retention (obverse of turnover).

Analysis 7: A cumulative odds ordinal logistic regression with proportional odds was run to determine the effect of organization size on the belief that organization size significantly impacts HRIS-enabled day-to-day human resources (HR) transactional record keeping practices such as, entering payroll information, employee status changes, *etc.* and HRM performance employee involvement, trust, loyalty, commitment and “social climate” between workers and management.

The results were analysed under three categories, namely test for multicollinearity, proportional odds (PLUM), model fit (PLUM and GENLIN) and test of model effects (GENLIN).

Test for multicollinearity:

Coefficients^a

		Collinearity Statistics	
		Tolerance	VIF
1	Less_than_500	.583	1.716
	Between_500_and_5000	.583	1.716

a. Dependent Variable: Q7 - HR-enabled
Transactional-HR Performance (Day2Day-Invole.
Trust.Loyal.commit.)

Since all the Tolerance values are greater than 0.1 (the lowest is 0.583) and VIF values are much less than 10, therefore, **there is no problem with collinearity** in this particular data set.

Proportional Odds

The assumption of proportional odds is fundamental to the particular type of (cumulative) ordinal logistic regression model. This assumption means that each independent variable has an identical effect at each cumulative split of the ordinal dependent variable.

- This assumption can be tested formally using the statistical test that is generated when the test of parallel lines option in the **Ordinal Regression: Output** dialogue box is selected and the **Test of Parallel Lines** table is presented.

Test of Parallel Lines ^a				
Model	-2 Log Likelihood	Chi-Square	df	Sig.
Null Hypothesis	45.620			
General	38.180	7.440	6	.282

The null hypothesis states that the location parameters (slope coefficients) are the same across response categories.

a. Link function: Logit.

- This test works by comparing the model fit (the "**-2 Log Likelihood**" column) to the two different cumulative odds models.
- The two models that are compared are the proportional odds model (the "**Null Hypothesis**" row) and the cumulative odds model *without* the proportional odds constraint/assumption (the "**General**" row); *i.e.*, a model where the slope coefficients (relationship) are allowed to be different for each cumulative logit.
- If the assumption of proportional odds is met, one would expect the difference in model fit (the "**Chi-square**" column) between these two models to be small and not statistically significant ($p > .05$).
- Alternatively, if the assumption of proportional odds is violated, one would expect the difference in fit between these two models to be large and statistically significant ($p < .05$).
- The statistical significance level (p -value) of this test can be found in the "**Sig.**" column.
- In this analysis, $p = .282$, which is greater than .05 and, therefore, the assumption of proportional odds is met (*i.e.*, this assumption is valid).
- To report this result:

*The assumption of proportional odds was met, as assessed by a full likelihood ratio test comparing the residual of the fitted location model to a model with varying location parameters, $\chi^2(6) = 7.440$, $p = .282$ (*i.e.* $p > 0.05$).*

Model fit

1. Overall goodness-of-fit tests

SPSS generates two tests of the overall goodness-of-fit of the model (*i.e.*, an overall measure of whether the model fits the data well). These are the Pearson and Deviance goodness-of-fit tests, as shown below in the **Goodness-of-Fit** table:

Goodness-of-Fit			
	Chi-Square	df	Sig.
Pearson	7.467	6	.280
Deviance	7.440	6	.282

Link function: Logit.

- Both the Pearson (the "**Pearson Chi-Square**" row) and deviance (the "**Deviance**" row) statistics are designed to provide a measure of how poorly the model fits the data (or the variations in the model that cannot be explained).
- Because the test statistics measure how poor the model is, one is actually looking for these tests to be not statistically significant to indicate a good model fit (*i.e.*, $p > .05$ in the "**Sig.**" column).
- Based on the analysis above, to report the result:
 - The Pearson goodness-of-fit test indicated that the model was **a good fit** to the observed data, $\chi^2(6) = 7.467, p = .280$ (*i.e.*, $p > .05$).
 - The Deviance goodness-of-fit test indicated that the model was **a good fit** to the observed data, $\chi^2(6) = 7.440, p = .282$ (*i.e.*, $p > .05$).

2. Likelihood-ratio test

A better method of assessing model fit is to look at the difference in model fit (in the PLUM analysis) when comparing the full model to the intercept-only model.

- The likelihood-ratio test is presented in the **Model Fitting Information** table, as shown below:

Model Fitting Information				
Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	51.596			
Final	45.620	5.976	2	.050

Link function: Logit.

- The model fit (the **"-2 Log Likelihood"** column) is 51.596 for the intercept-only model (the **"Intercept Only"** row) compared to the model with the intercept and all independent variables (the **"Final"** row), which has a -2 log likelihood of 45.620.
- The smaller the -2 log likelihood value, the better the fit. As such, the greater the difference between the two models, the better the independent variable is at explaining the dependent variable.
- The difference between the two -2 log likelihood values is presented in the **"Chi-Square"** column with 3 degrees of freedom (**"df"**) and the statistical significance level (*p*-value) of this test can be found in the **"Sig."** column.
- If the significance value was less than .05 (*i.e.*, $p < .05$), the independent variables would add to the prediction of the dependent variable. Since the significance value was greater than .05 (*i.e.*, $p > .05$), the independent variable does not add to the prediction of the dependent variable.
- In this analysis, the result can be stated as:

*According to the Model Fitting Information table obtained from PLUM analysis, the independent variable does not add to the prediction of the dependent variable; $\chi^2(2) = 5.976$, $p = .050$, (*i.e.*, $p = .05$).*

GENLIN parameter estimates: Tests of Model Effects (Polytomous variables)

The GENLIN procedure reports an overall test of significance for each variable entered into the logistic regression model in the **Tests of Model Effects** table given below:

Tests of Model Effects			
Source	Type III		
	Wald Chi-Square	df	Sig.
org_size	5.937	2	.051

Dependent Variable: Q7 - HR-enabled Transactional-HR Performance (Day2Day-Invole. Trust.Loyal.commit.)
Model: (Threshold), org_size

- The table above shows the omnibus test result for the org_size variable using the Wald test statistic.
- The hypothesis test value is presented in the **"Wald Chi-Square"** column with 3 degrees of freedom (**"df"**) and the statistical significance level (*p*-value) of this test can be found in the **"Sig."** column.
- If the significance value was less than .05 (*i.e.*, $p < .05$), the independent variable would add to the prediction of the dependent variable. Since the significance value was greater

than .05 (*i.e.*, $p > .05$), the independent variable does not add to the prediction of the dependent variable.

- Therefore, the result can be stated as:

*The above table clearly states that the independent variable has no significant effect on the dependent variable; Wald $\chi^2 (2) = 5.937$, $p = .051$ (*i.e.*, $p > .05$).*

The result: Multicollinearity: **No**; Proportional odds: **Yes**, $\chi^2 (6) = 7.440$, $p = .282$ ($p > 0.05$); Pearson goodness-of-fit: **Yes**, $\chi^2 (6) = 7.467$, $p = .280$ (*i.e.*, $p > .05$); Deviance goodness-of-fit: **Yes**, $\chi^2 (6) = 7.440$, $p = .282$ (*i.e.*, $p > .05$); Likelihood-ratio test: **Yes**, $\chi^2 (2) = 5.976$, $p = .050$ (*i.e.* $p = .05$); Model Effects: **No**, Wald $\chi^2 (2) = 5.937$, $p = .051$ (*i.e.*, $p < .05$).

Discussion: Therefore, based on the analysis above, the conclusion here is that the model passes the multicollinearity test and meets the proportional odds and goodness of fit requirements, and while one of the two decisive factors of this analysis, the likelihood-ratio test has statistically significant effect, the tests of model effects suggest that the organization size **has no statistically significant effect** on HRIS-enabled day-to-day HR transactional record keeping practices such as, entering payroll information, employee status changes, *etc.* and HRM performance employee involvement, trust, loyalty, commitment and “social climate” between workers and management.

Analysis 8: A cumulative odds ordinal logistic regression with proportional odds was run to determine the effect of organization size on the belief that organization size significantly impacts HRIS-enabled human resources (HR) transactional employee benefits administration practices such as overseeing the health insurance coverage, administering investment and retirement program, *etc.* and HRM performance related to employee satisfaction, motivation, presence (obverse of absenteeism) and retention (obverse of turnover).

The results were analysed under three categories, namely test for multicollinearity, proportional odds (PLUM), model fit (PLUM and GENLIN) and test of model effects (GENLIN).

Test for multicollinearity:

Coefficients ^a			
Model		Collinearity Statistics	
		Tolerance	VIF
1	Less_than_500	.583	1.716
	Between_500_and_5000	.583	1.716

a. Dependent Variable: Q8 - HR-enabled Transactional-HR Performance (Benefit Admin-Satis.Motivation.Presense.Retention)

Since all the Tolerance values are greater than 0.1 (the lowest is 0.583) and VIF values are much less than 10, therefore, **there is no problem with collinearity** in this particular data set.

Proportional Odds

The assumption of proportional odds is fundamental to the particular type of (cumulative) ordinal logistic regression model. This assumption means that each independent variable has an identical effect at each cumulative split of the ordinal dependent variable.

- This assumption can be tested formally using the statistical test that is generated when the test of parallel lines option in the **Ordinal Regression: Output** dialogue box is selected and the **Test of Parallel Lines** table is presented.

Test of Parallel Lines^a

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Null Hypothesis	53.122			
General	30.877	22.246	6	.001

The null hypothesis states that the location parameters (slope coefficients) are the same across response categories.

a. Link function: Logit.

- This test works by comparing the model fit (the "**-2 Log Likelihood**" column) to the two different cumulative odds models.
- The two models that are compared are the proportional odds model (the "**Null Hypothesis**" row) and the cumulative odds model *without* the proportional odds constraint/assumption (the "**General**" row); *i.e.*, a model where the slope coefficients (relationship) are allowed to be different for each cumulative logit.
- If the assumption of proportional odds is met, one would expect the difference in model fit (the "**Chi-square**" column) between these two models to be small and not statistically significant ($p > .05$).
- Alternatively, if the assumption of proportional odds is violated, one would expect the difference in fit between these two models to be large and statistically significant ($p < .05$).
- The statistical significance level (p -value) of this test can be found in the "**Sig.**" column.
- In this analysis, $p = .001$, which is less than .05 and, therefore, the assumption of proportional odds is not met (*i.e.*, this assumption is not valid).
- To report this result:

The assumption of proportional odds was not met, as assessed by a full likelihood ratio test comparing the residual of the fitted location model to a model with varying location parameters, $\chi^2(6) = 22.246, p = .001$ (i.e. $p < 0.05$).

Model fit

1. Overall goodness-of-fit tests

SPSS generates two tests of the overall goodness-of-fit of the model (i.e., an overall measure of whether the model fits the data well). These are the Pearson and Deviance goodness-of-fit tests, as shown below in the **Goodness-of-Fit** table:

Goodness-of-Fit			
	Chi-Square	df	Sig.
Pearson	19.074	6	.004
Deviance	22.246	6	.001

Link function: Logit.

- Both the Pearson (the "**Pearson Chi-Square**" row) and deviance (the "**Deviance**" row) statistics are designed to provide a measure of how poorly the model fits the data (or the variations in the model that cannot be explained).
- Because the test statistics measure how poor the model is, one is actually looking for these tests to be not statistically significant to indicate a good model fit (i.e., $p > .05$ in the "**Sig.**" column).
- Based on the analysis above, to report the result:
 - *The Pearson goodness-of-fit test indicated that the model was **not a good fit** to the observed data, $\chi^2(6) = 19.074, p = .004$ (i.e., $p < .05$).*
 - *The Deviance goodness-of-fit test indicated that the model was **not a good fit** to the observed data, $\chi^2(6) = 22.246, p = .001$ (i.e., $p < .05$).*

2. Likelihood-ratio test

A better method of assessing model fit is to look at the difference in model fit (in the PLUM analysis) when comparing the full model to the intercept-only model.

- The likelihood-ratio test is presented in the **Model Fitting Information** table, as shown below:

Model Fitting Information

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	53.305			
Final	53.122	.183	2	.913

Link function: Logit.

- The model fit (the "**-2 Log Likelihood**" column) is 53.305 for the intercept-only model (the "**Intercept Only**" row) compared to the model with the intercept and all independent variables (the "**Final**" row), which has a -2 log likelihood of 53.122.
- The smaller the -2 log likelihood value, the better the fit. As such, the greater the difference between the two models, the better the independent variable is at explaining the dependent variable.
- The difference between the two -2 log likelihood values is presented in the "**Chi-Square**" column with 3 degrees of freedom ("**df**") and the statistical significance level (*p*-value) of this test can be found in the "**Sig.**" column.
- If the significance value was less than .05 (*i.e.*, $p < .05$), the independent variables would add to the prediction of the dependent variable. Since the significance value was greater than .05 (*i.e.*, $p > .05$), the independent variable does not add to the prediction of the dependent variable.
- In this analysis, the result can be stated as:

*According to the Model Fitting Information table obtained from PLUM analysis, the independent variable does not add to the prediction of the dependent variable; $\chi^2(2) = .183$, $p = .913$, (*i.e.*, $p > .05$).*

GENLIN parameter estimates: Tests of Model Effects (Polytomous variables)

The GENLIN procedure reports an overall test of significance for each variable entered into the logistic regression model in the **Tests of Model Effects** table given below:

Tests of Model Effects

Source	Type III		
	Wald Chi-Square	df	Sig.
org_size	.203	2	.904

Dependent Variable: Q8 - HR-enabled
Transactional-HR Performance (Benefit Admin-
Satis.Motivation.Presense.Retention)
Model: (Threshold), org_size

- The table above shows the omnibus test result for the org_size variable using the Wald test statistic.

- The hypothesis test value is presented in the "**Wald Chi-Square**" column with 3 degrees of freedom ("**df**") and the statistical significance level (*p*-value) of this test can be found in the "**Sig.**" column.
- If the significance value was less than .05 (*i.e.*, $p < .05$), the independent variable would add to the prediction of the dependent variable. Since the significance value was greater than .05 (*i.e.*, $p > .05$), the independent variable does not add to the prediction of the dependent variable.
- Therefore, the result can be stated as:

*The above table clearly states that the independent variable has no significant effect on the dependent variable; Wald $\chi^2 (2) = .203$, $p = .904$ (*i.e.*, $p > .05$).*

The result: Multicollinearity: **No**; Proportional odds: **No**, $\chi^2 (6) = 22.246$, $p = .001$ ($p < 0.05$); Pearson goodness-of-fit: **No**, $\chi^2 (6) = 19.074$, $p = .004$ (*i.e.*, $p < .05$); Deviance goodness-of-fit: **No**, $\chi^2 (6) = 22.246$, $p = .001$ (*i.e.*, $p < .05$); Likelihood-ratio test: **No**, $\chi^2 (2) = 0.183$, $p = .913$; Model Effects: **No**, Wald $\chi^2 (2) = 0.203$, $p = .904$ (*i.e.*, $p > .05$).

Discussion: Therefore, based on the analysis above, the conclusion here is that despite the fact that the model pass the multicollinearity test but does not meet the proportional odds and goodness of fit requirements and also the two decisive factors of this analysis, the likelihood-ratio test and the tests of model effects suggest that the organization size **has no statistically significant effect** on HRIS-enabled HR transactional employee benefits administration practices such as overseeing the health insurance coverage, administering investment and retirement program, *etc.* and HRM performance related to employee satisfaction, motivation, presence (obverse of absenteeism) and retention (obverse of turnover).

Analysis 9: A cumulative odds ordinal logistic regression with proportional odds was run to determine the effect of organization size on the belief that organization size significantly impacts HRIS-enabled human resources (HR) transactional employee benefits administration practices such as overseeing the health insurance coverage, administering investment and retirement program, *etc.* and HRM performance employee involvement, trust, loyalty, commitment and “social climate” between workers and management.

The results were analysed under three categories, namely test for multicollinearity, proportional odds (PLUM), model fit (PLUM and GENLIN) and test of model effects (GENLIN).

Test for multicollinearity:

Coefficients ^a			
Model		Collinearity Statistics	
		Tolerance	VIF
1	Less_than_500	.583	1.716
	Between_500_and_5000	.583	1.716

a. Dependent Variable: Q9 - HR-enabled
Transactional-HR Performance (Benefit Admin-
Invole.Trust.Loyal.commit.)

Since all the Tolerance values are greater than 0.1 (the lowest is 0.583) and VIF values are much less than 10, therefore, **there is no problem with collinearity** in this particular data set.

Proportional Odds

The assumption of proportional odds is fundamental to the particular type of (cumulative) ordinal logistic regression model. This assumption means that each independent variable has an identical effect at each cumulative split of the ordinal dependent variable.

- This assumption can be tested formally using the statistical test that is generated when the test of parallel lines option in the **Ordinal Regression: Output** dialogue box is selected and the **Test of Parallel Lines** table is presented.

Test of Parallel Lines ^a				
Model	-2 Log Likelihood	Chi-Square	df	Sig.
Null Hypothesis	48.404			
General	34.718	13.685	6	.033

The null hypothesis states that the location parameters (slope coefficients) are the same across response categories.

a. Link function: Logit.

- This test works by comparing the model fit (the "**-2 Log Likelihood**" column) to the two different cumulative odds models.
- The two models that are compared are the proportional odds model (the "**Null Hypothesis**" row) and the cumulative odds model *without* the proportional odds constraint/assumption (the "**General**" row); *i.e.*, a model where the slope coefficients (relationship) are allowed to be different for each cumulative logit.
- If the assumption of proportional odds is met, one would expect the difference in model fit (the "**Chi-square**" column) between these two models to be small and not statistically significant ($p > .05$).

- Alternatively, if the assumption of proportional odds is violated, one would expect the difference in fit between these two models to be large and statistically significant ($p < .05$).
- The statistical significance level (p -value) of this test can be found in the "Sig." column.
- In this analysis, $p = .033$, which is less than .05 and, therefore, the assumption of proportional odds is not met (*i.e.*, this assumption is valid).
- To report this result:

*The assumption of proportional odds was not met, as assessed by a full likelihood ratio test comparing the residual of the fitted location model to a model with varying location parameters, $\chi^2(6) = 13.685, p = .033$ (*i.e.* $p < 0.05$).*

Model fit

1. Overall goodness-of-fit tests

SPSS generates two tests of the overall goodness-of-fit of the model (*i.e.*, an overall measure of whether the model fits the data well). These are the Pearson and Deviance goodness-of-fit tests, as shown below in the **Goodness-of-Fit** table:

Goodness-of-Fit			
	Chi-Square	df	Sig.
Pearson	13.354	6	.038
Deviance	13.685	6	.033

Link function: Logit.

- Both the Pearson (the "**Pearson Chi-Square**" row) and deviance (the "**Deviance**" row) statistics are designed to provide a measure of how poorly the model fits the data (or the variations in the model that cannot be explained).
- Because the test statistics measure how poor the model is, one is actually looking for these tests to be not statistically significant to indicate a good model fit (*i.e.*, $p > .05$ in the "Sig." column).
- Based on the analysis above, to report the result:
 - *The Pearson goodness-of-fit test indicated that the model was **not a good fit** to the observed data, $\chi^2(6) = 13.354, p = .038$ (*i.e.*, $p < .05$).*
 - *The Deviance goodness-of-fit test indicated that the model was **not a good fit** to the observed data, $\chi^2(6) = 13.685, p = .033$ (*i.e.*, $p < .05$).*

2. Likelihood-ratio test

A better method of assessing model fit is to look at the difference in model fit (in the PLUM analysis) when comparing the full model to the intercept-only model.

- The likelihood-ratio test is presented in the **Model Fitting Information** table, as shown below:

Model Fitting Information				
Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	48.803			
Final	48.404	.400	2	.819

Link function: Logit.

- The model fit (the "**-2 Log Likelihood**" column) is 48.803 for the intercept-only model (the "**Intercept Only**" row) compared to the model with the intercept and all independent variables (the "**Final**" row), which has a -2 log likelihood of 48.404.
- The smaller the -2 log likelihood value, the better the fit. As such, the greater the difference between the two models, the better the independent variable is at explaining the dependent variable.
- The difference between the two -2 log likelihood values is presented in the "**Chi-Square**" column with 3 degrees of freedom ("**df**") and the statistical significance level (p -value) of this test can be found in the "**Sig.**" column.
- If the significance value was less than .05 (*i.e.*, $p < .05$), the independent variables would add to the prediction of the dependent variable. Since the significance value was greater than .05 (*i.e.*, $p > .05$), the independent variable does not add to the prediction of the dependent variable.
- In this analysis, the result can be stated as:

*According to the Model Fitting Information table obtained from PLUM analysis, the independent variable does not add to the prediction of the dependent variable; $\chi^2(2) = .400$, $p = .819$, (*i.e.*, $p > .05$).*

GENLIN parameter estimates: Tests of Model Effects (Polytomous variables)

The GENLIN procedure reports an overall test of significance for each variable entered into the logistic regression model in the **Tests of Model Effects** table given below:

Tests of Model Effects

Source	Type III		
	Wald Chi-Square	df	Sig.
org_size	.421	2	.810

Dependent Variable: Q9 - HR-enabled
Transactional-HR Performance (Benefit Admin-
Invole.Trust.Loyal.commit.)
Model: (Threshold), org_size

- The table above shows the omnibus test result for the org_size variable using the Wald test statistic.
- The hypothesis test value is presented in the "**Wald Chi-Square**" column with 3 degrees of freedom ("**df**") and the statistical significance level (*p*-value) of this test can be found in the "**Sig.**" column.
- If the significance value was less than .05 (*i.e.*, $p < .05$), the independent variable would add to the prediction of the dependent variable. Since the significance value was greater than .05 (*i.e.*, $p > .05$), the independent variable does not add to the prediction of the dependent variable.
- Therefore, the result can be stated as:

*The above table clearly states that the independent variable has no significant effect on the dependent variable; Wald $\chi^2 (2) = .421$, $p = .810$ (*i.e.*, $p > .05$).*

The result: Multicollinearity: **No**; Proportional odds: **No**, $\chi^2 (6) = 13.685$, $p = .033$ ($p < 0.05$); Pearson goodness-of-fit: **No**, $\chi^2 (6) = 13.354$, $p = .038$ (*i.e.*, $p < .05$); Deviance goodness-of-fit: **No**, $\chi^2 (6) = 13.685$, $p = .033$ (*i.e.*, $p < .05$); Likelihood-ratio test: **No**, $\chi^2 (2) = 0.400$, $p = .819$; Model Effects: **No**, Wald $\chi^2 (2) = 0.421$, $p = .810$ (*i.e.*, $p > .05$).

Discussion: Therefore, based on the analysis above, the conclusion here is that despite the fact that the model pass the multicollinearity test but does not meet the proportional odds and goodness of fit requirements and also the two decisive factors of this analysis, the likelihood-ratio test and the tests of model effects suggest that the organization size **has no statistically significant effect** on HRIS-enabled HR transactional employee benefits administration practices such as overseeing the health insurance coverage, administering investment and retirement program, *etc.* and HRM performance employee involvement, trust, loyalty, commitment and “social climate” between workers and management.

Analysis 10: A cumulative odds ordinal logistic regression with proportional odds was run to determine the effect of organization size on the belief that organization size significantly impacts HRIS-enabled human resources (HR) traditional management practices related to employee recruitment, selection, training, promotion, and compensation, and HRM performance related to employee satisfaction, motivation, presence (obverse of absenteeism) and retention (obverse of turnover).

The results were analysed under three categories, namely test for multicollinearity, proportional odds (PLUM), model fit (PLUM and GENLIN) and test of model effects (GENLIN).

Test for multicollinearity:

Coefficients^a

Model		Collinearity Statistics	
		Tolerance	VIF
1	Less_than_500	.583	1.716
	Between_500_and_5000	.583	1.716

a. Dependent Variable: Q10 - HR-enabled Traditional-HR Performance (Day2Day-Satis.Motivation.Presense.Retention)

Since all the Tolerance values are greater than 0.1 (the lowest is 0.583) and VIF values are much less than 10, therefore, **there is no problem with collinearity** in this particular data set.

Proportional Odds

The assumption of proportional odds is fundamental to the particular type of (cumulative) ordinal logistic regression model. This assumption means that each independent variable has an identical effect at each cumulative split of the ordinal dependent variable.

- This assumption can be tested formally using the statistical test that is generated when the test of parallel lines option in the **Ordinal Regression: Output** dialogue box is selected and the **Test of Parallel Lines** table is presented.

Test of Parallel Lines^a

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Null Hypothesis	38.111			
General	30.906	7.205	6	.302

The null hypothesis states that the location parameters (slope coefficients) are the same across response categories.

a. Link function: Logit.

- This test works by comparing the model fit (the "**-2 Log Likelihood**" column) to the two different cumulative odds models.
- The two models that are compared are the proportional odds model (the "**Null Hypothesis**" row) and the cumulative odds model *without* the proportional odds constraint/assumption (the "**General**" row); *i.e.*, a model where the slope coefficients (relationship) are allowed to be different for each cumulative logit.
- If the assumption of proportional odds is met, one would expect the difference in model fit (the "**Chi-square**" column) between these two models to be small and not statistically significant ($p > .05$).
- Alternatively, if the assumption of proportional odds is violated, one would expect the difference in fit between these two models to be large and statistically significant ($p < .05$).
- The statistical significance level (p -value) of this test can be found in the "**Sig.**" column.
- In this analysis, $p = .302$, which is greater than .05 and, therefore, the assumption of proportional odds is met (*i.e.*, this assumption is valid).
- To report this result:

*The assumption of proportional odds was met, as assessed by a full likelihood ratio test comparing the residual of the fitted location model to a model with varying location parameters, $\chi^2(6) = 7.205$, $p = .302$ (*i.e.* $p > 0.05$).*

Model fit

1. Overall goodness-of-fit tests

SPSS generates two tests of the overall goodness-of-fit of the model (*i.e.*, an overall measure of whether the model fits the data well). These are the Pearson and Deviance goodness-of-fit tests, as shown below in the **Goodness-of-Fit** table:

Goodness-of-Fit			
	Chi-Square	df	Sig.
Pearson	5.591	6	.471
Deviance	7.205	6	.302

Link function: Logit.

- Both the Pearson (the "**Pearson Chi-Square**" row) and deviance (the "**Deviance**" row) statistics are designed to provide a measure of how poorly the model fits the data (or the variations in the model that cannot be explained).

- Because the test statistics measure how poor the model is, one is actually looking for these tests to be not statistically significant to indicate a good model fit (*i.e.*, $p > .05$ in the "**Sig.**" column).
- Based on the analysis above, to report the result:
 - *The Pearson goodness-of-fit test indicated that the model was **a good fit** to the observed data, $\chi^2 (6) = 5.591, p = .471$ (*i.e.*, $p > .05$).*
 - *The Deviance goodness-of-fit test indicated that the model was **a good fit** to the observed data, $\chi^2 (6) = 7.205, p = .302$ (*i.e.*, $p > .05$).*

2. Likelihood-ratio test

A better method of assessing model fit is to look at the difference in model fit (in the PLUM analysis) when comparing the full model to the intercept-only model.

- The likelihood-ratio test is presented in the **Model Fitting Information** table, as shown below:

Model Fitting Information				
Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	38.782			
Final	38.111	.671	2	.715

Link function: Logit.

- The model fit (the "**-2 Log Likelihood**" column) is 38.782 for the intercept-only model (the "**Intercept Only**" row) compared to the model with the intercept and all independent variables (the "**Final**" row), which has a -2 log likelihood of 38.111.
- The smaller the -2 log likelihood value, the better the fit. As such, the greater the difference between the two models, the better the independent variable is at explaining the dependent variable.
- The difference between the two -2 log likelihood values is presented in the "**Chi-Square**" column with 3 degrees of freedom ("**df**") and the statistical significance level (p -value) of this test can be found in the "**Sig.**" column.
- If the significance value was less than .05 (*i.e.*, $p < .05$), the independent variables would add to the prediction of the dependent variable. Since the significance value was greater than .05 (*i.e.*, $p > .05$), the independent variable does not add to the prediction of the dependent variable.
- In this analysis, the result can be stated as:

According to the Model Fitting Information table obtained from PLUM analysis, the independent variable does not add to the prediction of the dependent variable; $\chi^2 (2) = .671, p = .715$, (i.e., $p > .05$).

GENLIN parameter estimates: Tests of Model Effects (Polytomous variables)

The GENLIN procedure reports an overall test of significance for each variable entered into the logistic regression model in the **Tests of Model Effects** table given below:

Tests of Model Effects			
Source	Type III		
	Wald Chi-Square	df	Sig.
org_size	.702	2	.704

Dependent Variable: Q10 - HR-enabled
Traditional-HR Performance (Day2Day-Satis.
Motivation.Presense.Retention)
Model: (Threshold), org_size

- The table above shows the omnibus test result for the org_size variable using the Wald test statistic.
- The hypothesis test value is presented in the "**Wald Chi-Square**" column with 3 degrees of freedom ("**df**") and the statistical significance level (p -value) of this test can be found in the "**Sig.**" column.
- If the significance value was less than .05 (i.e., $p < .05$), the independent variable would add to the prediction of the dependent variable. Since the significance value was greater than .05 (i.e., $p > .05$), the independent variable does not add to the prediction of the dependent variable.
- Therefore, the result can be stated as:

The above table clearly states that the independent variable has no significant effect on the dependent variable; Wald $\chi^2 (2) = .702, p = .704$ (i.e., $p > .05$).

The result: Multicollinearity: **No**; Proportional odds: **Yes**, $\chi^2 (6) = 7.205, p = .302$ ($p > 0.05$); Pearson goodness-of-fit: **Yes**, $\chi^2 (6) = 5.591, p = .471$ (i.e., $p > .05$); Deviance goodness-of-fit: **Yes**, $\chi^2 (6) = 7.205, p = .302$ (i.e., $p > .05$); Likelihood-ratio test: **No**, $\chi^2 (2) = 0.671, p = .715$ (i.e. $p > .05$); Model Effects: **No**, Wald $\chi^2 (2) = 0.702, p = .704$ (i.e., $p > .05$).

Discussion: Therefore, based on the analysis above, the conclusion here is that despite the fact that the model pass the multicollinearity test and meets the proportional odds and goodness of fit requirements, the two decisive factors of this analysis, the

likelihood-ratio test and the tests of model effects suggest that the organization size **has no statistically significant effect** on HRIS-enabled HR traditional management practices related to employee recruitment, selection, training, promotion, and compensation, and HRM performance related to employee satisfaction, motivation, presence (obverse of absenteeism) and retention (obverse of turnover).

Analysis 11: A cumulative odds ordinal logistic regression with proportional odds was run to determine the effect of organization size on the belief that organization size significantly impacts HRIS-enabled human resources (HR) traditional management practices related to employee recruitment, selection, training, promotion, and compensation, and HRM performance employee involvement, trust, loyalty, commitment and “social climate” between workers and management.

The results were analysed under three categories, namely test for multicollinearity, proportional odds (PLUM), model fit (PLUM and GENLIN) and test of model effects (GENLIN).

Test for multicollinearity:

Coefficients^a

Model		Collinearity Statistics	
		Tolerance	VIF
1	Less_than_500	.583	1.716
	Between_500_and_5000	.583	1.716

a. Dependent Variable: Q11 - HR-enabled Traditional-
HR Performance (Day2Day-Invole.Trust.Loyal.
commit.)

Since all the Tolerance values are greater than 0.1 (the lowest is 0.583) and VIF values are much less than 10, therefore, **there is no problem with collinearity** in this particular data set.

Proportional Odds

The assumption of proportional odds is fundamental to the particular type of (cumulative) ordinal logistic regression model. This assumption means that each independent variable has an identical effect at each cumulative split of the ordinal dependent variable.

- This assumption can be tested formally using the statistical test that is generated when the test of parallel lines option in the **Ordinal Regression: Output** dialogue box is selected and the **Test of Parallel Lines** table is presented.

Test of Parallel Lines^a

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Null Hypothesis	37.143			
General	30.746	6.396	6	.380

The null hypothesis states that the location parameters (slope coefficients) are the same across response categories.

a. Link function: Logit.

- This test works by comparing the model fit (the "**-2 Log Likelihood**" column) to the two different cumulative odds models.
- The two models that are compared are the proportional odds model (the "**Null Hypothesis**" row) and the cumulative odds model *without* the proportional odds constraint/assumption (the "**General**" row); *i.e.*, a model where the slope coefficients (relationship) are allowed to be different for each cumulative logit.
- If the assumption of proportional odds is met, one would expect the difference in model fit (the "**Chi-square**" column) between these two models to be small and not statistically significant ($p > .05$).
- Alternatively, if the assumption of proportional odds is violated, one would expect the difference in fit between these two models to be large and statistically significant ($p < .05$).
- The statistical significance level (p -value) of this test can be found in the "**Sig.**" column.
- In this analysis, $p = .380$, which is greater than .05 and, therefore, the assumption of proportional odds is met (*i.e.*, this assumption is valid).
- To report this result:

*The assumption of proportional odds was met, as assessed by a full likelihood ratio test comparing the residual of the fitted location model to a model with varying location parameters, $\chi^2(6) = 6.396$, $p = .380$ (*i.e.* $p > 0.05$).*

Model fit

1. Overall goodness-of-fit tests

SPSS generates two tests of the overall goodness-of-fit of the model (*i.e.*, an overall measure of whether the model fits the data well). These are the Pearson and Deviance goodness-of-fit tests, as shown below in the **Goodness-of-Fit** table:

Goodness-of-Fit

	Chi-Square	df	Sig.
Pearson	5.467	6	.485
Deviance	6.396	6	.380

Link function: Logit.

- Both the Pearson (the "**Pearson Chi-Square**" row) and deviance (the "**Deviance**" row) statistics are designed to provide a measure of how poorly the model fits the data (or the variations in the model that cannot be explained).
- Because the test statistics measure how poor the model is, one is actually looking for these tests to be not statistically significant to indicate a good model fit (*i.e.*, $p > .05$ in the "**Sig.**" column).
- Based on the analysis above, to report the result:
 - *The Pearson goodness-of-fit test indicated that the model was **a good fit** to the observed data, $\chi^2(6) = 5.467, p = .485$ (*i.e.*, $p > .05$).*
 - *The Deviance goodness-of-fit test indicated that the model was **a good fit** to the observed data, $\chi^2(6) = 6.936, p = .380$ (*i.e.*, $p > .05$).*

2. Likelihood-ratio test

A better method of assessing model fit is to look at the difference in model fit (in the PLUM analysis) when comparing the full model to the intercept-only model.

- The likelihood-ratio test is presented in the **Model Fitting Information** table, as shown below:

Model Fitting Information

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	38.117			
Final	37.143	.974	2	.614

Link function: Logit.

- The model fit (the "**-2 Log Likelihood**" column) is 38.117 for the intercept-only model (the "**Intercept Only**" row) compared to the model with the intercept and all independent variables (the "**Final**" row), which has a -2 log likelihood of 37.143.
- The smaller the -2 log likelihood value, the better the fit. As such, the greater the difference between the two models, the better the independent variable is at explaining the dependent variable.

- The difference between the two -2 log likelihood values is presented in the "**Chi-Square**" column with 3 degrees of freedom ("**df**") and the statistical significance level (*p*-value) of this test can be found in the "**Sig.**" column.
- If the significance value was less than .05 (*i.e.*, $p < .05$), the independent variables would add to the prediction of the dependent variable. Since the significance value was greater than .05 (*i.e.*, $p > .05$), the independent variable does not add to the prediction of the dependent variable.
- In this analysis, the result can be stated as:

*According to the Model Fitting Information table obtained from PLUM analysis, the independent variable does not add to the prediction of the dependent variable; $\chi^2 (2) = .974$, $p = .614$, (*i.e.*, $p > .05$).*

GENLIN parameter estimates: Tests of Model Effects (Polytomous variables)

The GENLIN procedure reports an overall test of significance for each variable entered into the logistic regression model in the **Tests of Model Effects** table given below:

Tests of Model Effects			
Source	Type III		
	Wald Chi-Square	df	Sig.
org_size	.984	2	.611

Dependent Variable: Q11 - HR-enabled
Traditional-HR Performance (Day2Day-Invole.
Trust.Loyal.commit.)
Model: (Threshold), org_size

- The table above shows the omnibus test result for the org_size variable using the Wald test statistic.
- The hypothesis test value is presented in the "**Wald Chi-Square**" column with 3 degrees of freedom ("**df**") and the statistical significance level (*p*-value) of this test can be found in the "**Sig.**" column.
- If the significance value was less than .05 (*i.e.*, $p < .05$), the independent variable would add to the prediction of the dependent variable. Since the significance value was greater than .05 (*i.e.*, $p > .05$), the independent variable does not add to the prediction of the dependent variable.
- Therefore, the result can be stated as:

*The above table clearly states that the independent variable has no significant effect on the dependent variable; Wald $\chi^2 (2) = .984$, $p = .611$ (*i.e.*, $p > .05$).*

The result: Multicollinearity: **No**; Proportional odds: **Yes**, $\chi^2 (6) = 6.396, p = .380$ ($p > 0.05$); Pearson goodness-of-fit: **Yes**, $\chi^2 (6) = 5.467, p = .485$ (*i.e.*, $p > .05$); Deviance goodness-of-fit: **Yes**, $\chi^2 (6) = 6.396, p = .380$ (*i.e.*, $p > .05$); Likelihood-ratio test: **No**, $\chi^2 (2) = 0.974, p = .614$ (*i.e.* $p > .05$); Model Effects: **No**, Wald $\chi^2 (2) = 0.984, p = .611$ (*i.e.*, $p > .05$).

Discussion: Therefore, based on the analysis above, the conclusion here is that despite the fact that the model pass the multicollinearity test and meets the proportional odds and goodness of fit requirements, the two decisive factors of this analysis, the likelihood-ratio test and the tests of model effects suggest that the organization size **has no statistically significant effect** on HRIS-enabled HR traditional management practices related to employee recruitment, selection, training, promotion, and compensation, and HRM performance employee involvement, trust, loyalty, commitment and “social climate” between workers and management.

Analysis 12: A cumulative odds ordinal logistic regression with proportional odds was run to determine the effect of organization size on the belief that organization size significantly impacts HRIS-enabled human resources (HR) traditional management practices related to employee performance management, rewards, career development and communication (employee relations), and HRM performance related to employee satisfaction, motivation, presence (obverse of absenteeism) and retention (obverse of turnover).

The results were analysed under three categories, namely test for multicollinearity, proportional odds (PLUM), model fit (PLUM and GENLIN) and test of model effects (GENLIN).

Test for multicollinearity:

Coefficients^a

Model		Collinearity Statistics	
		Tolerance	VIF
1	Less_than_500	.583	1.716
	Between_500_and_5000	.583	1.716

a. Dependent Variable: Q12 - HR-enabled Traditional-HR Performance (Benefit Admin-Satis.Motivation.Presence.Retention)

Since all the Tolerance values are greater than 0.1 (the lowest is 0.583) and VIF values are much less than 10, therefore, **there is no problem with collinearity** in this particular data set.

Proportional Odds

The assumption of proportional odds is fundamental to the particular type of (cumulative) ordinal logistic regression model. This assumption means that each independent variable has an identical effect at each cumulative split of the ordinal dependent variable.

- This assumption can be tested formally using the statistical test that is generated when the test of parallel lines option in the **Ordinal Regression: Output** dialogue box is selected and the **Test of Parallel Lines** table is presented.

Test of Parallel Lines ^a				
Model	-2 Log Likelihood	Chi-Square	df	Sig.
Null Hypothesis	31.724			
General	28.069	3.655	4	.455

The null hypothesis states that the location parameters (slope coefficients) are the same across response categories.

a. Link function: Logit.

- This test works by comparing the model fit (the "**-2 Log Likelihood**" column) to the two different cumulative odds models.
- The two models that are compared are the proportional odds model (the "**Null Hypothesis**" row) and the cumulative odds model *without* the proportional odds constraint/assumption (the "**General**" row); *i.e.*, a model where the slope coefficients (relationship) are allowed to be different for each cumulative logit.
- If the assumption of proportional odds is met, one would expect the difference in model fit (the "**Chi-square**" column) between these two models to be small and not statistically significant ($p > .05$).
- Alternatively, if the assumption of proportional odds is violated, one would expect the difference in fit between these two models to be large and statistically significant ($p < .05$).
- The statistical significance level (p -value) of this test can be found in the "**Sig.**" column.
- In this analysis, $p = .455$, which is greater than .05 and, therefore, the assumption of proportional odds is met (*i.e.*, this assumption is valid).
- To report this result:

*The assumption of proportional odds was met, as assessed by a full likelihood ratio test comparing the residual of the fitted location model to a model with varying location parameters, $\chi^2(6) = 3.655$, $p = .455$ (*i.e.* $p > 0.05$).*

Model fit

1. Overall goodness-of-fit tests

SPSS generates two tests of the overall goodness-of-fit of the model (*i.e.*, an overall measure of whether the model fits the data well). These are the Pearson and Deviance goodness-of-fit tests, as shown below in the **Goodness-of-Fit** table:

Goodness-of-Fit			
	Chi-Square	df	Sig.
Pearson	4.000	4	.406
Deviance	3.655	4	.455

Link function: Logit.

- Both the Pearson (the "**Pearson Chi-Square**" row) and deviance (the "**Deviance**" row) statistics are designed to provide a measure of how poorly the model fits the data (or the variations in the model that cannot be explained).
- Because the test statistics measure how poor the model is, one is actually looking for these tests to be not statistically significant to indicate a good model fit (*i.e.*, $p > .05$ in the "**Sig.**" column).
- Based on the analysis above, to report the result:
 - The Pearson goodness-of-fit test indicated that the model was **a good fit** to the observed data, $\chi^2(6) = 4.000, p = .406$ (*i.e.*, $p > .05$).
 - The Deviance goodness-of-fit test indicated that the model was **a good fit** to the observed data, $\chi^2(6) = 3.655, p = .455$ (*i.e.*, $p > .05$).

2. Likelihood-ratio test

A better method of assessing model fit is to look at the difference in model fit (in the PLUM analysis) when comparing the full model to the intercept-only model.

- The likelihood-ratio test is presented in the **Model Fitting Information** table, as shown below:

Model Fitting Information				
Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	33.698			
Final	31.724	1.974	2	.373

Link function: Logit.

- The model fit (the **"-2 Log Likelihood"** column) is 33.698 for the intercept-only model (the **"Intercept Only"** row) compared to the model with the intercept and all independent variables (the **"Final"** row), which has a -2 log likelihood of 31.724.
- The smaller the -2 log likelihood value, the better the fit. As such, the greater the difference between the two models, the better the independent variable is at explaining the dependent variable.
- The difference between the two -2 log likelihood values is presented in the **"Chi-Square"** column with 3 degrees of freedom (**"df"**) and the statistical significance level (*p*-value) of this test can be found in the **"Sig."** column.
- If the significance value was less than .05 (*i.e.*, $p < .05$), the independent variables would add to the prediction of the dependent variable. Since the significance value was greater than .05 (*i.e.*, $p > .05$), the independent variable does not add to the prediction of the dependent variable.
- In this analysis, the result can be stated as:

*According to the Model Fitting Information table obtained from PLUM analysis, the independent variable does not add to the prediction of the dependent variable; $\chi^2(2) = 3.655$, $p = .455$, (*i.e.*, $p > .05$).*

GENLIN parameter estimates: Tests of Model Effects (Polytomous variables)

The GENLIN procedure reports an overall test of significance for each variable entered into the logistic regression model in the **Tests of Model Effects** table given below:

Tests of Model Effects			
Source	Type III		
	Wald Chi-Square	df	Sig.
org_size	1.955	2	.376

Dependent Variable: Q12 - HR-enabled
Traditional-HR Performance (Benefit Admin-Satis.
Motivation.Presense.Retention)
Model: (Threshold), org_size

- The table above shows the omnibus test result for the org_size variable using the Wald test statistic.
- The hypothesis test value is presented in the **"Wald Chi-Square"** column with 3 degrees of freedom (**"df"**) and the statistical significance level (*p*-value) of this test can be found in the **"Sig."** column.
- If the significance value was less than .05 (*i.e.*, $p < .05$), the independent variable would add to the prediction of the dependent variable. Since the significance value was greater

than .05 (*i.e.*, $p > .05$), the independent variable does not add to the prediction of the dependent variable.

- Therefore, the result can be stated as:

*The above table clearly states that the independent variable has no significant effect on the dependent variable; Wald $\chi^2 (2) = 1.955$, $p = .376$ (*i.e.*, $p > .05$).*

The result: Multicollinearity: **No**; Proportional odds: **Yes**, $\chi^2 (4) = 3.655$, $p = .455$ ($p > 0.05$); Pearson goodness-of-fit: **Yes**, $\chi^2 (4) = 4.000$, $p = .406$ (*i.e.*, $p > .05$); Deviance goodness-of-fit: **Yes**, $\chi^2 (4) = 3.655$, $p = .455$ (*i.e.*, $p > .05$); Likelihood-ratio test: **No**, $\chi^2(2) = 1.974$, $p = .373$ (*i.e.* $p > .05$); Model Effects: **No**, Wald $\chi^2 (2) = 1.955$, $p = .376$ (*i.e.*, $p > .05$).

Discussion: Therefore, based on the analysis above, the conclusion here is that despite the fact that the model pass the multicollinearity test and meets the proportional odds and goodness of fit requirements, the two decisive factors of this analysis, the likelihood-ratio test and the tests of model effects suggest that the organization size **has no statistically significant effect** on HRIS-enabled HR traditional management practices related to employee performance management, rewards, career development and communication (employee relations), and HRM performance related to employee satisfaction, motivation, presence (obverse of absenteeism) and retention (obverse of turnover).

Analysis 13: A cumulative odds ordinal logistic regression with proportional odds was run to determine the effect of organization size on the belief that organization size significantly impacts HRIS-enabled human resources (HR) traditional management practices related to employee performance management, rewards, career development and communication (employee relations), and HRM performance employee involvement, trust, loyalty, commitment and “social climate” between workers and management.

The results were analysed under three categories, namely test for multicollinearity, proportional odds (PLUM), model fit (PLUM and GENLIN) and test of model effects (GENLIN).

Test for multicollinearity:

Coefficients ^a			
Model		Collinearity Statistics	
		Tolerance	VIF
1	Less_than_500	.583	1.716
	Between_500_and_5000	.583	1.716

a. Dependent Variable: Q13 - HR-enabled Traditional-HR Performance (Benefit Admin-Invole.Trust.Loyal.commit.)

Since all the Tolerance values are greater than 0.1 (the lowest is 0.583) and VIF values are much less than 10, therefore, **there is no problem with collinearity** in this particular data set.

Proportional Odds

The assumption of proportional odds is fundamental to the particular type of (cumulative) ordinal logistic regression model. This assumption means that each independent variable has an identical effect at each cumulative split of the ordinal dependent variable.

- This assumption can be tested formally using the statistical test that is generated when the test of parallel lines option in the **Ordinal Regression: Output** dialogue box is selected and the **Test of Parallel Lines** table is presented.

Test of Parallel Lines ^a				
Model	-2 Log Likelihood	Chi-Square	df	Sig.
Null Hypothesis	37.626			
General	31.598	6.029	6	.420

The null hypothesis states that the location parameters (slope coefficients) are the same across response categories.

a. Link function: Logit.

- This test works by comparing the model fit (the "**-2 Log Likelihood**" column) to the two different cumulative odds models.
- The two models that are compared are the proportional odds model (the "**Null Hypothesis**" row) and the cumulative odds model *without* the proportional odds constraint/assumption (the "**General**" row); *i.e.*, a model where the slope coefficients (relationship) are allowed to be different for each cumulative logit.
- If the assumption of proportional odds is met, one would expect the difference in model fit (the "**Chi-square**" column) between these two models to be small and not statistically significant ($p > .05$).

- Alternatively, if the assumption of proportional odds is violated, one would expect the difference in fit between these two models to be large and statistically significant ($p < .05$).
- The statistical significance level (p -value) of this test can be found in the "Sig." column.
- In this analysis, $p = .420$, which is greater than .05 and, therefore, the assumption of proportional odds is met (*i.e.*, this assumption is valid).
- To report this result:

*The assumption of proportional odds was met, as assessed by a full likelihood ratio test comparing the residual of the fitted location model to a model with varying location parameters, $\chi^2(6) = 6.029$, $p = .420$ (*i.e.* $p > 0.05$).*

Model fit

1. Overall goodness-of-fit tests

SPSS generates two tests of the overall goodness-of-fit of the model (*i.e.*, an overall measure of whether the model fits the data well). These are the Pearson and Deviance goodness-of-fit tests, as shown below in the **Goodness-of-Fit** table:

Goodness-of-Fit			
	Chi-Square	df	Sig.
Pearson	6.227	6	.398
Deviance	6.029	6	.420

Link function: Logit.

- Both the Pearson (the "**Pearson Chi-Square**" row) and deviance (the "**Deviance**" row) statistics are designed to provide a measure of how poorly the model fits the data (or the variations in the model that cannot be explained).
- Because the test statistics measure how poor the model is, one is actually looking for these tests to be not statistically significant to indicate a good model fit (*i.e.*, $p > .05$ in the "Sig." column).
- Based on the analysis above, to report the result:
 - *The Pearson goodness-of-fit test indicated that the model was **a good fit** to the observed data, $\chi^2(6) = 6.227$, $p = .398$ (*i.e.*, $p > .05$).*
 - *The Deviance goodness-of-fit test indicated that the model was **a good fit** to the observed data, $\chi^2(6) = 6.029$, $p = .420$ (*i.e.*, $p > .05$).*

2. Likelihood-ratio test

A better method of assessing model fit is to look at the difference in model fit (in the PLUM analysis) when comparing the full model to the intercept-only model.

- The likelihood-ratio test is presented in the **Model Fitting Information** table, as shown below:

Model Fitting Information				
Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	39.071			
Final	37.626	1.445	2	.486

Link function: Logit.

- The model fit (the "**-2 Log Likelihood**" column) is 39.071 for the intercept-only model (the "**Intercept Only**" row) compared to the model with the intercept and all independent variables (the "**Final**" row), which has a -2 log likelihood of 37.626.
- The smaller the -2 log likelihood value, the better the fit. As such, the greater the difference between the two models, the better the independent variable is at explaining the dependent variable.
- The difference between the two -2 log likelihood values is presented in the "**Chi-Square**" column with 3 degrees of freedom ("**df**") and the statistical significance level (*p*-value) of this test can be found in the "**Sig.**" column.
- If the significance value was less than .05 (*i.e.*, $p < .05$), the independent variables would add to the prediction of the dependent variable. Since the significance value was greater than .05 (*i.e.*, $p > .05$), the independent variable does not add to the prediction of the dependent variable.
- In this analysis, the result can be stated as:

*According to the Model Fitting Information table obtained from PLUM analysis, the independent variable does not add to the prediction of the dependent variable; $\chi^2 (2) = 1.445$, $p = .486$, (*i.e.*, $p > .05$).*

GENLIN parameter estimates: Tests of Model Effects (Polytomous variables)

The GENLIN procedure reports an overall test of significance for each variable entered into the logistic regression model in the **Tests of Model Effects** table given below:

Tests of Model Effects

Source	Type III		
	Wald Chi-Square	df	Sig.
org_size	1.524	2	.467

Dependent Variable: Q13 - HR-enabled
Traditional-HR Performance (Benefit Admin-
Involve.Trust.Loyal.commit.)
Model: (Threshold), org_size

- The table above shows the omnibus test result for the org_size variable using the Wald test statistic.
- The hypothesis test value is presented in the "**Wald Chi-Square**" column with 3 degrees of freedom ("**df**") and the statistical significance level (*p*-value) of this test can be found in the "**Sig.**" column.
- If the significance value was less than .05 (*i.e.*, $p < .05$), the independent variable would add to the prediction of the dependent variable. Since the significance value was greater than .05 (*i.e.*, $p > .05$), the independent variable does not add to the prediction of the dependent variable.
- Therefore, the result can be stated as:

*The above table clearly states that the independent variable has no significant effect on the dependent variable; Wald $\chi^2 (2) = 1.524$, $p = .467$ (*i.e.*, $p > .05$).*

The result: Multicollinearity: **No**; Proportional odds: **Yes**, $\chi^2 (6) = 6.029$, $p = .420$; Pearson goodness-of-fit: **Yes**, $\chi^2 (6) = 6.227$, $p = .398$ (*i.e.*, $p > .05$); Deviance goodness-of-fit: **Yes**, $\chi^2 (6) = 6.029$, $p = .420$ (*i.e.*, $p > .05$); Likelihood-ratio test: **No**, $\chi^2 (2) = 1.445$, $p = .486$ (*i.e.* $p > .05$); Model Effects: **No**, Wald $\chi^2 (2) = 1.524$, $p = .467$ (*i.e.*, $p > .05$).

Discussion: Therefore, based on the analysis above, the conclusion here is that despite the fact that the model pass the multicollinearity test and meets the proportional odds and goodness of fit requirements, the two decisive factors of this analysis, the likelihood-ratio test and the tests of model effects suggest that the organization size **has no statistically significant effect** on HRIS-enabled HR traditional management practices related to employee performance management, rewards, career development and communication (employee relations), and HRM performance employee involvement, trust, loyalty, commitment and “social climate” between workers and management.

Analysis 14: A cumulative odds ordinal logistic regression with proportional odds was run to determine the effect of organization size on the belief that organization size significantly impacts HRIS-enabled human resources (HR) transformational management practices that meet strategic organizational objectives such as strategic planning, organizational development, knowledge management and change management, and HRM performance related to employee satisfaction, motivation, presence (obverse of absenteeism) and retention (obverse of turnover). The results were analysed under three categories, namely test for multicollinearity, proportional odds (PLUM), model fit (PLUM and GENLIN) and test of model effects (GENLIN).

Test for multicollinearity:

Coefficients^a

Model		Collinearity Statistics	
		Tolerance	VIF
1	Less_than_500	.583	1.716
	Between_500_and_5000	.583	1.716

a. Dependent Variable: Q14 - HR-enabled Transformational-HR Performance (Transformational-Satis.Motivation.Presense. Retention)

Since all the Tolerance values are greater than 0.1 (the lowest is 0.583) and VIF values are much less than 10, therefore, **there is no problem with collinearity** in this particular data set.

Proportional Odds

The assumption of proportional odds is fundamental to the particular type of (cumulative) ordinal logistic regression model. This assumption means that each independent variable has an identical effect at each cumulative split of the ordinal dependent variable.

- This assumption can be tested formally using the statistical test that is generated when the test of parallel lines option in the **Ordinal Regression: Output** dialogue box is selected and the **Test of Parallel Lines** table is presented.

Test of Parallel Lines^a

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Null Hypothesis	38.354			
General	32.049	6.304	6	.390

The null hypothesis states that the location parameters (slope coefficients) are the same across response categories.

a. Link function: Logit.

- This test works by comparing the model fit (the "**-2 Log Likelihood**" column) to the two different cumulative odds models.
- The two models that are compared are the proportional odds model (the "**Null Hypothesis**" row) and the cumulative odds model *without* the proportional odds constraint/assumption (the "**General**" row); *i.e.*, a model where the slope coefficients (relationship) are allowed to be different for each cumulative logit.
- If the assumption of proportional odds is met, one would expect the difference in model fit (the "**Chi-square**" column) between these two models to be small and not statistically significant ($p > .05$).
- Alternatively, if the assumption of proportional odds is violated, one would expect the difference in fit between these two models to be large and statistically significant ($p < .05$).
- The statistical significance level (p -value) of this test can be found in the "**Sig.**" column.
- In this analysis, $p = .390$, which is greater than .05 and, therefore, the assumption of proportional odds is met (*i.e.*, this assumption is valid).
- To report this result:

*The assumption of proportional odds was met, as assessed by a full likelihood ratio test comparing the residual of the fitted location model to a model with varying location parameters, $\chi^2(6) = 6.304$, $p = .390$ (*i.e.* $p > 0.05$).*

Model fit

1. Overall goodness-of-fit tests

SPSS generates two tests of the overall goodness-of-fit of the model (*i.e.*, an overall measure of whether the model fits the data well). These are the Pearson and Deviance goodness-of-fit tests, as shown below in the **Goodness-of-Fit** table:

Goodness-of-Fit

	Chi-Square	df	Sig.
Pearson	6.597	6	.360
Deviance	6.304	6	.390

Link function: Logit.

- Both the Pearson (the "**Pearson Chi-Square**" row) and deviance (the "**Deviance**" row) statistics are designed to provide a measure of how poorly the model fits the data (or the variations in the model that cannot be explained).
- Because the test statistics measure how poor the model is, one is actually looking for these tests to be not statistically significant to indicate a good model fit (*i.e.*, $p > .05$ in the "**Sig.**" column).
- Based on the analysis above, to report the result:
 - *The Pearson goodness-of-fit test indicated that the model was **a good fit** to the observed data, $\chi^2(6) = 6.597, p = .360$ (*i.e.*, $p > .05$).*
 - *The Deviance goodness-of-fit test indicated that the model was **a good fit** to the observed data, $\chi^2(6) = 6.304, p = .390$ (*i.e.*, $p > .05$).*

2. Likelihood-ratio test

A better method of assessing model fit is to look at the difference in model fit (in the PLUM analysis) when comparing the full model to the intercept-only model.

- The likelihood-ratio test is presented in the **Model Fitting Information** table, as shown below:

Model Fitting Information

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	40.628			
Final	38.354	2.275	2	.321

Link function: Logit.

- The model fit (the "**-2 Log Likelihood**" column) is 40.628 for the intercept-only model (the "**Intercept Only**" row) compared to the model with the intercept and all independent variables (the "**Final**" row), which has a -2 log likelihood of 38.354.
- The smaller the -2 log likelihood value, the better the fit. As such, the greater the difference between the two models, the better the independent variable is at explaining the dependent variable.

- The difference between the two -2 log likelihood values is presented in the "**Chi-Square**" column with 3 degrees of freedom ("**df**") and the statistical significance level (p -value) of this test can be found in the "**Sig.**" column.
- If the significance value was less than .05 (*i.e.*, $p < .05$), the independent variables would add to the prediction of the dependent variable. Since the significance value was greater than .05 (*i.e.*, $p > .05$), the independent variable does not add to the prediction of the dependent variable.
- In this analysis, the result can be stated as:

*According to the Model Fitting Information table obtained from PLUM analysis, the independent variable does not add to the prediction of the dependent variable; $\chi^2 (2) = 2.275, p = .321$, (*i.e.*, $p > .05$).*

GENLIN parameter estimates: Tests of Model Effects (Polytomous variables)

The GENLIN procedure reports an overall test of significance for each variable entered into the logistic regression model in the **Tests of Model Effects** table given below:

Tests of Model Effects			
Source	Type III		
	Wald Chi-Square	df	Sig.
org_size	2.191	2	.334

Dependent Variable: Q14 - HR-enabled Transformational-HR Performance (Transformational-Satis.Motivation.Presense. Retention)
Model: (Threshold), org_size

- The table above shows the omnibus test result for the org_size variable using the Wald test statistic.
- The hypothesis test value is presented in the "**Wald Chi-Square**" column with 3 degrees of freedom ("**df**") and the statistical significance level (p -value) of this test can be found in the "**Sig.**" column.
- If the significance value was less than .05 (*i.e.*, $p < .05$), the independent variable would add to the prediction of the dependent variable. Since the significance value was greater than .05 (*i.e.*, $p > .05$), the independent variable does not add to the prediction of the dependent variable.
- Therefore, the result can be stated as:

*The above table clearly states that the independent variable has no significant effect on the dependent variable; Wald $\chi^2 (2) = 2.191, p = .334$ (*i.e.*, $p > .05$).*

The result: Multicollinearity: **No**; Proportional odds: **Yes**, $\chi^2 (6) = 6.304, p = .390$; Pearson goodness-of-fit: **Yes**, $\chi^2 (6) = 6.597, p = .360$ (*i.e.*, $p > .05$); Deviance goodness-of-fit: **Yes**, $\chi^2 (6) = 6.304, p = .390$ (*i.e.*, $p > .05$); Likelihood-ratio test: **No**, $\chi^2 (2) = 2.275, p = .321$ (*i.e.* $p > .05$); Model Effects: **No**, Wald $\chi^2 (2) = 2.191, p = .334$ (*i.e.*, $p > .05$).

Discussion: Therefore, based on the analysis above, the conclusion here is that despite the fact that the model pass the multicollinearity test and meets the proportional odds and goodness of fit requirements, the two decisive factors of this analysis, the likelihood-ratio test and the tests of model effects suggest that the organization size **has no statistically significant effect** on HRIS-enabled HR transformational management practices that meet strategic organizational objectives such as strategic planning, organizational development, knowledge management and change management, and HRM performance related to employee satisfaction, motivation, presence (obverse of absenteeism) and retention (obverse of turnover).

Analysis 15: A cumulative odds ordinal logistic regression with proportional odds was run to determine the effect of organization size on the belief that organization size significantly impacts HRIS-enabled human resources (HR) transformational management practices that meet strategic organizational objectives such as strategic planning, organizational development, knowledge management and change management, and HRM performance employee involvement, trust, loyalty, commitment and “social climate” between workers and management.

The results were analysed under three categories, namely test for multicollinearity, proportional odds (PLUM), model fit (PLUM and GENLIN) and test of model effects (GENLIN).

Test for multicollinearity:

Coefficients^a

Model		Collinearity Statistics	
		Tolerance	VIF
1	Less_than_500	.583	1.716
	Between_500_and_5000	.583	1.716

a. Dependent Variable: Q15 - HR-enabled Transformational-HR Performance (Transformational-Invole.Trust.Loyal.commit.)

Since all the Tolerance values are greater than 0.1 (the lowest is 0.583) and VIF values are much less than 10, therefore, **there is no problem with collinearity** in this particular data set.

Proportional Odds

The assumption of proportional odds is fundamental to the particular type of (cumulative) ordinal logistic regression model. This assumption means that each independent variable has an identical effect at each cumulative split of the ordinal dependent variable.

- This assumption can be tested formally using the statistical test that is generated when the test of parallel lines option in the **Ordinal Regression: Output** dialogue box is selected and the **Test of Parallel Lines** table is presented.

Test of Parallel Lines^a

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Null Hypothesis	37.591			
General	32.403	5.188	6	.520

The null hypothesis states that the location parameters (slope coefficients) are the same across response categories.

a. Link function: Logit.

- This test works by comparing the model fit (the "**-2 Log Likelihood**" column) to the two different cumulative odds models.
- The two models that are compared are the proportional odds model (the "**Null Hypothesis**" row) and the cumulative odds model *without* the proportional odds constraint/assumption (the "**General**" row); *i.e.*, a model where the slope coefficients (relationship) are allowed to be different for each cumulative logit.
- If the assumption of proportional odds is met, one would expect the difference in model fit (the "**Chi-square**" column) between these two models to be small and not statistically significant ($p > .05$).
- Alternatively, if the assumption of proportional odds is violated, one would expect the difference in fit between these two models to be large and statistically significant ($p < .05$).
- The statistical significance level (p -value) of this test can be found in the "**Sig.**" column.
- In this analysis, $p = .520$, which is greater than .05 and, therefore, the assumption of proportional odds is met (*i.e.*, this assumption is valid).
- To report this result:

The assumption of proportional odds was met, as assessed by a full likelihood ratio test comparing the residual of the fitted location model to a model with varying location parameters, $\chi^2(6) = 5.188, p = .520$ (i.e. $p > 0.05$).

Model fit

1. Overall goodness-of-fit tests

SPSS generates two tests of the overall goodness-of-fit of the model (i.e., an overall measure of whether the model fits the data well). These are the Pearson and Deviance goodness-of-fit tests, as shown below in the **Goodness-of-Fit** table:

Goodness-of-Fit			
	Chi-Square	df	Sig.
Pearson	4.699	6	.583
Deviance	5.188	6	.520

Link function: Logit.

- Both the Pearson (the "**Pearson Chi-Square**" row) and deviance (the "**Deviance**" row) statistics are designed to provide a measure of how poorly the model fits the data (or the variations in the model that cannot be explained).
- Because the test statistics measure how poor the model is, one is actually looking for these tests to be not statistically significant to indicate a good model fit (i.e., $p > .05$ in the "**Sig.**" column).
- Based on the analysis above, to report the result:
 - *The Pearson goodness-of-fit test indicated that the model was **a good fit** to the observed data, $\chi^2(6) = 4.699, p = .583$ (i.e., $p > .05$).*
 - *The Deviance goodness-of-fit test indicated that the model was **a good fit** to the observed data, $\chi^2(6) = 5.188, p = .520$ (i.e., $p > .05$).*

2. Likelihood-ratio test

A better method of assessing model fit is to look at the difference in model fit (in the PLUM analysis) when comparing the full model to the intercept-only model.

- The likelihood-ratio test is presented in the **Model Fitting Information** table, as shown below:

Model Fitting Information

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	39.389			
Final	37.591	1.798	2	.407

Link function: Logit.

- The model fit (the "**-2 Log Likelihood**" column) is 39.389 for the intercept-only model (the "**Intercept Only**" row) compared to the model with the intercept and all independent variables (the "**Final**" row), which has a -2 log likelihood of 37.591.
- The smaller the -2 log likelihood value, the better the fit. As such, the greater the difference between the two models, the better the independent variable is at explaining the dependent variable.
- The difference between the two -2 log likelihood values is presented in the "**Chi-Square**" column with 3 degrees of freedom ("**df**") and the statistical significance level (*p*-value) of this test can be found in the "**Sig.**" column.
- If the significance value was less than .05 (*i.e.*, $p < .05$), the independent variables would add to the prediction of the dependent variable. Since the significance value was greater than .05 (*i.e.*, $p > .05$), the independent variable does not add to the prediction of the dependent variable.
- In this analysis, the result can be stated as:

*According to the Model Fitting Information table obtained from PLUM analysis, the independent variable does not add to the prediction of the dependent variable; $\chi^2(2) = 1.798$, $p = .407$, (*i.e.*, $p > .05$).*

GENLIN parameter estimates: Tests of Model Effects (Polytomous variables)

The GENLIN procedure reports an overall test of significance for each variable entered into the logistic regression model in the **Tests of Model Effects** table given below:

Tests of Model Effects

Source	Type III		
	Wald Chi-Square	df	Sig.
org_size	1.737	2	.420

Dependent Variable: Q15 - HR-enabled
Transformational-HR Performance
(Transformational-Invole.Trust.Loyal.commit.)
Model: (Threshold), org_size

- The table above shows the omnibus test result for the org_size variable using the Wald test statistic.

- The hypothesis test value is presented in the "**Wald Chi-Square**" column with 3 degrees of freedom ("**df**") and the statistical significance level (*p*-value) of this test can be found in the "**Sig.**" column.
- If the significance value was less than .05 (*i.e.*, $p < .05$), the independent variable would add to the prediction of the dependent variable. Since the significance value was greater than .05 (*i.e.*, $p > .05$), the independent variable does not add to the prediction of the dependent variable.
- Therefore, the result can be stated as:

*The above table clearly states that the independent variable has no significant effect on the dependent variable; Wald $\chi^2 (2) = 1.737, p = .420$ (*i.e.*, $p > .05$).*

The result: Multicollinearity: **No**; Proportional odds: **Yes**, $\chi^2 (6) = 5.188, p = .520$; Pearson goodness-of-fit: **Yes**, $\chi^2 (6) = 4.699, p = .583$ (*i.e.*, $p > .05$); Deviance goodness-of-fit: **Yes**, $\chi^2 (6) = 5.188, p = .520$ (*i.e.*, $p > .05$); Likelihood-ratio test: **No**, $\chi^2 (2) = 1.798, p = .407$ (*i.e.* $p > .05$); Model Effects: **No**, Wald $\chi^2 (2) = 1.737, p = .420$ (*i.e.*, $p > .05$).

Discussion: Therefore, based on the analysis above, the conclusion here is that despite the fact that the model pass the multicollinearity test and meets the proportional odds and goodness of fit requirements, the two decisive factors of this analysis, the likelihood-ratio test and the tests of model effects suggest that the organization size **has no statistically significant effect** on HRIS-enabled HR transformational management practices that meet strategic organizational objectives such as strategic planning, organizational development, knowledge management and change management, and HRM performance employee involvement, trust, loyalty, commitment and “social climate” between workers and management.

Table 10.5 - Results: Impact of organization size on HRIS-enabled HR performance

Analysis	Multicollinearity	Proportional Odds			Goodness-of-fit tests						Likelihood-ratio			Tests of Model Effects		
					Pearson			Deviance								
		Chi-Square (χ^2)	<i>P</i> -value	Met?	Chi-Square (χ^2)	<i>P</i> -value	Fit?	Chi-Square (χ^2)	<i>P</i> -value	Fit?	Chi-Square (χ^2)	<i>P</i> -value	Sig. Effect?	Wald Chi-Square (χ^2)	<i>P</i> -value	Sig. Effect?
6	No	3.381	.760	Yes <i>P</i> >.05	4.351	.629	Yes <i>P</i> >.05	3.381	.760	Yes <i>P</i> >.05	14.080	.001	Yes <i>P</i> <.05	13.560	.001	Yes <i>P</i> <.05
7	No	7.440	.282	Yes <i>P</i> >.05	7.467	.280	Yes <i>P</i> >.05	7.440	.282	Yes <i>P</i> >.05	5.976	.050	Yes <i>P</i> =.05	5.937	.051	No <i>P</i> >.05
8	No	22.246	.001	No <i>P</i> <.05	19.074	.004	No <i>P</i> <.05	22.246	.001	Yes <i>P</i> >.05	0.183	.913	No <i>P</i> >.05	0.203	.904	No <i>P</i> >.05
9	No	13.685	.033	No <i>P</i> <.05	13.354	.038	No <i>P</i> <.05	13.685	.033	No <i>P</i> <.05	0.400	.819	No <i>P</i> >.05	0.421	.810	No <i>P</i> >.05
10	No	7.205	.302	Yes <i>P</i> >.05	5.591	.471	Yes <i>P</i> >.05	7.205	.302	Yes <i>P</i> >.05	0.671	.715	No <i>P</i> >.05	0.702	.704	No <i>P</i> >.05
11	No	6.396	.380	Yes <i>P</i> >.05	5.467	.485	Yes <i>P</i> >.05	6.396	.380	Yes <i>P</i> >.05	0.974	.614	No <i>P</i> >.05	0.984	.611	No <i>P</i> >.05
12	No	3.655	.455	Yes <i>P</i> >.05	4.000	.406	Yes <i>P</i> >.05	3.655	.455	Yes <i>P</i> >.05	1.974	.373	No <i>P</i> >.05	1.955	.376	No <i>P</i> >.05
13	No	6.029	.420	Yes <i>P</i> >.05	6.227	.398	Yes <i>P</i> >.05	6.029	.420	Yes <i>P</i> >.05	1.445	.486	No <i>P</i> >.05	1.524	.467	No <i>P</i> >.05
14	No	6.304	.390	Yes <i>P</i> >.05	6.597	.360	Yes <i>P</i> >.05	6.304	.390	Yes <i>P</i> >.05	2.275	.321	No <i>P</i> >.05	2.191	.334	No <i>P</i> >.05
15	No	5.188	.520	Yes <i>P</i> >.05	4.699	.583	Yes <i>P</i> >.05	5.188	.520	Yes <i>P</i> >.05	1.798	.407	No <i>P</i> >.05	1.737	.420	No <i>P</i> >.05

10.4 Conclusion

A cumulative odds ordinal logistic regression with proportional odds was run to determine the effect of organization type and organization size on the belief that organization type and organization size significantly impacts the human resource information system -enabled human resources practices, namely, transactional, traditional and transformational, and human resources management . In order to conduct the OLR regression with proportional odds fifteen individual analyses are needed for each independent variables. For the ease of understanding, these fifteen analyses are categorized into two sections. The first five analyses test the impact of organization type or size on HR practices and analyses six through fifteen test the impact of organization type or organization size on HRM performance.

With reference to the analysis of organization type vs. the impacts of the HRIS-enabled HR practices and performance, all the model results show no statistically significant effect. With reference to the analysis of organization size vs. the impacts of the HRIS-enabled HR practices and performance, the majority of the fifteen analyses show no statistically significant effect. Outliers in this data include analysis 2, the impacts of organization size on HRIS-enabled HR transactional employee benefits administration practices, and analysis 6, the impacts of organization size on HRIS-enabled day-to-day HR transactional record keeping practices, which have a statistically significant effect.

The following chapter will conclude and make recommendations.

Chapter 11

Conclusions, limitations, recommendations for future work and contribution to knowledge

The purpose of this chapter is to draw conclusions about the initial research questions based on the work conducted in this thesis. As a reminder, the research questions are:

Research question 1 (RQ1): Does the HRIS-enabled HR practices (namely transactional, traditional and transformational) significantly impact the HRM Performance?

Research question 2 (RQ2): Does the type of an organization significantly impact the HRIS-enabled HRM performance model?

Research question 3 (RQ3): Does the size of an organization significantly impact the HRIS-enabled HRM performance model)?

Additionally, while identifying the limitations of this study, this chapter will focus on making recommendations for future researchers. These recommendations will give suggested avenues for further study.

11.1 Need for the study

While the demanding nature of the current global economy has placed business process management (BPM) at the centre of effective organization management, information and communication technologies (ICT) have changed the way businesses perform their BPM practices. Therefore, it is widely accepted that BPM, a contemporary management approach that focuses on managing overall business processes within an organization to accomplish the organizational goal also relies on modern ICT systems. The ICT systems that are aligned with BPM are known as BPM systems (BPMS) (Shaw *et al.*, 2007). Furthermore, along with the other key factors, an organization needs to employ an ICT process enabled approach to maximize its BPM outcome. This study creates an awareness of the contribution of ICT on BPM by analyzing the linkage between impacts of human resource information systems (HRIS) on human resources management (HRM) performance.

Although there are plenty of academic discussions available on the BPM-firm performance relationship, the literature does not provide constructive information on how the adoption of ICT impacts the BPM performance (particularly HRM performance). As a result, the researcher emphasizes that this research is not about the impacts of ‘BPM-firm performance’ relationship, rather it is about the ‘ICT adoption-BPM performance’ or explicitly, ‘HRIS adoption-HRM performance’ relationship, where HRIS is a form of BPM system and HRM is a sub-domain of BPM.

In this research, the target population is human resources professionals who have access to HRIS within their organizations in a Canadian context. The reasons for restricting the population and the sample to Canada were:

1. There is no study involving the Canadian context that addresses ‘HRIS-enabled HRM performance’ from the BPM perspective.
2. Since this is a single-researcher study with a strict timeline and resources restriction, data collection was more practical and accessible within a specific (*i.e.* Canadian) context.
3. The researcher is a Canadian citizen who has an extensive work experience and familiarity within the Canadian work settings. Therefore, his level of understanding of the main research constructs such as ICT and human resources management within Canadian context is considerably practical and reasonable.

11.2 Research outline

In order to find an answer to the three research questions mentioned above, a conceptual model was developed with strong theoretical background by incorporating the works informed by Lee *et al.* (2012) and Paauwe and Richardson (1997) to examine the following five hypotheses:

Hypothesis 1 (H1): HRIS-enabled HR transactional practices significantly impact the HRM Performance.

Hypothesis 2 (H2): HRIS-enabled HR traditional practices significantly impact the HRM Performance.

Hypothesis 3 (H3): HRIS-enabled HR transformational practices significantly impact the HRM Performance.

Hypothesis 4 (H4): Organization type significantly impacts the HRIS-enabled HRM performance model.

Hypothesis 5 (H5): Organization size significantly impacts the HRIS-enabled HRM performance model.

By nature, this study is a quantitative research that comes under the relativist epistemological assumptions and therefore assumed the deductive theory approach. Since the focus of this study (*i.e.* ‘HRIS-enabled HRM performance model’ in view of business process management) is a fairly new area of research that is not found in any existing literature, this author espoused the primary data collection method by employing a cross-sectional survey design. The Novi Systems was selected as the survey tool in this study for its versatility in areas such as cost effectiveness, ease of use, conditional logic with branching and skipping, real-time survey response browsing and reporting and so on. The survey questions were exclusively designed based on the ‘category scales’, *i.e.* the questions were both nominal and ordinal. While the screening question and the personal and organization information collection sections were unordered nominal category scale, the hypotheses testing questions were formed based on the five-point Likert scale ordinal category scale.

Since the precision and the bias are both low and the sample size in this study is ‘imprecisely right’, the researcher was convinced that the sample size in this survey was appropriate. In addition, the response rate was calculated based on the usable responses that was 140 and usable sample size (*i.e.* total sample - unsuitable or uncontactable members of the sample) was 194, thus the, **Response rate** = $(140 / 194) \times 100 = 72.2\%$. Bryman and Bell, (2007, pp.244 & 245) referring to Mangione’s classification, suggest that response rate between 70% and 85% is considered ‘very good’. Therefore, in this study, the response rate **72.2%** validates the survey in terms of sample representativeness.

Data analysis of this research is based on two known approaches, namely, Kendall’s tau-b correlation and ordinal logistic regression (OLR). Since Kendall’s tau, unlike other correlation, has an intuitively simple interpretation that employs an algebraic structure, Noether (1981) suggests that Kendall’s tau is one of the best approaches to measure the strength of the relationship. Since this study has a wide range of data distribution that tries to measure the strength of relationship between a HRIS-enabled HR practices and the HRM performance, this researcher has decided to adopt Kendall’s tau-b correlation.

Ordinal dependent variables that have natural ordering between their levels, such as Likert scale levels, can be predicted by one or more independent variables using OLR (Kleinbaum and Klein, 2002). In this study, ordinal logistic regression is used to predict the belief that the organization type and organization size impact the HRIS enabled HR practices, namely, transactional, traditional and transformational practices, and the HRM performance. The conclusions of these analyses (both Kendall's tau-b and ordinal logistic regression) are summarized and discussed in the next sections.

11.3 Conclusions for Research Question 1

Recall the main research question, research question 1 asks:

***RQ1:** Does the HRIS-enabled HR practices (namely transactional, traditional and transformational) significantly impact the HRM Performance?*

To answer the above question, the hypotheses generated in this thesis are the following:

- **Null Hypothesis 1 (H1_o):** HRIS-enabled HR transactional practices do not significantly impact the HRM Performance.
 - **Alternative Hypothesis 1 (H1):** HRIS-enabled HR transactional practices significantly impact the HRM Performance.
- **Null Hypothesis 2 (H2_o):** HRIS-enabled HR traditional practices do not significantly impact the HRM Performance.
 - **Alternative Hypothesis 2 (H2):** HRIS-enabled HR traditional practices significantly impact the HRM Performance.
- **Null Hypothesis 3 (H3_o):** HRIS-enabled HR transformational practices do not significantly impact the HRM Performance.
 - **Alternative Hypothesis 3 (H3):** HRIS-enabled HR transformational practices significantly impact the HRM Performance.

Recall, the target population is human resources professionals who have access to HRIS within their organization in a Canadian context. Data collection is completed using a cross-sectional survey with a positive sampling method. The variables used to test this hypothesis are divided into two types; the predictor (independent) variables were (a) HRIS-enabled HR transactional

practices, (b) HRIS-enabled HR traditional practices, and (c) HRIS-enabled HR transformational practices. The dependent variable was HRM Performance. Both these variables are ordinal variables measured on a 5-point Likert scale.

Since both the independent variables and the dependent variables are nonparametric ordinal variables and as this study has a wide range of data distribution that tries to measure the strength of relationships between a HRIS-enabled HR practices and the HRM performance, the Kendall tau-b correlation was used to identify the strength of relationship between independent and dependent variables.

11.3.1 Conclusions

In order to conduct the Kendall tau-b correlation, based on the survey questionnaire design, ten separate analyses were conducted. Based on the three aforementioned hypotheses, the ten analyses were then subdivided into three groups; the HRIS-enabled HR transactional practices on HRM performance (Analysis 1-4), the HRIS-enabled HR traditional practices on HRM performance (Analysis 5-8), and the HRIS-enabled HR transformational practices on HRM performance (Analysis 9-10).

Conclusion for Hypothesis 1 (H1):

For the first group, the HRIS-enabled HR transactional practices compared to HRM performance, the association results varied between smaller than typical and typical. Recall, the strength of relationship for ' r ' family values are measured from 0.0 to ± 1.0 .

The strength of relationship for Analysis 1 (relationship between HRIS-enabled day-to-day HR transactional record keeping practices such as, entering payroll information, employee status changes, etc. and HRM performance that is measured by overall employee satisfaction, motivation, presence and retention) and Analysis 2 (relationship between HRIS-enabled day-to-day HR transactional record keeping practices such as, entering payroll information, employee status changes, etc. and HRM performance that is measured by overall employee involvement, trust, commitment and social climate between workers and management) are +0.206 and +0.243 respectively. These two values are positively significant at 0.01 level, therefore, can be considered as smaller than typical in the strength of relationship. However, it should be noted that since the values of ' r ' (i.e. the correlation coefficient or strength of relationship) for these two analyses are closer to '0' (i.e. $r = .206$ and $r = .243$), greater portion

of the two data sets of each analysis being compared are discordant, thus to a certain extent, weak in association.

In the meantime, the strength of relationship for Analysis 3 (relationship between HRIS-enabled HR transactional benefit administration practices such as, overseeing the health insurance coverage, administering investment and retirement program, etc. and HRM performance that is measured by overall employee satisfaction, motivation, presence and retention) and Analysis 4 (relationship between HRIS-enabled HR transactional benefit administration practices such as, overseeing the health insurance coverage, administering investment and retirement program, etc. and HRM performance that is measured by overall employee involvement, trust, commitment and social climate between workers and management) are +0.385 and +0.344 respectively. These two values are positively significant at 0.01 level, therefore, can be considered as typical in the strength of relationship. However, it should be noted that since the values of 'r' (i.e. the correlation coefficient or strength of relationship) for these two analyses are closer to '0' (i.e. $r = .385$ and $r = .344$), greater portion of the two data sets of each analysis being compared are discordant, thus to a certain extent, weak in association.

Therefore, based on the overall results of these four analyses, the null hypothesis H_{10} can be rejected, thus the alternative hypothesis H_1 is accepted.

Conclusion for Hypothesis 2 (H2):

For the second group, the HRIS-enabled HR traditional practices compared to HRM performance, the association results varied between typical and larger than typical. Recall, the strength of relationship for 'r' family values are measured from 0.0 to ± 1.0 .

The strength of relationship for Analysis 5 (relationship between HRIS-enabled HR traditional management practices such as recruitment, selection, training, promotion and compensation, and HRM performance that is measured by overall employee satisfaction, motivation, presence and retention) and Analysis 6 (relationship between HRIS-enabled HR traditional management practices such as recruitment, selection, training, promotion and compensation, and HRM performance that is measured by overall employee involvement, trust, commitment and social climate between workers and management) are +0.346 and +0.397 respectively. These two values are positively significant at 0.01 level, therefore, can be considered as typical in the strength of relationship.

In the meantime, the strength of relationship for Analysis 7 (relationship between HRIS-enabled HR traditional management practices such as performance management, rewards, career development and communication, and HRM performance that is measured by overall employee satisfaction, motivation, presence and retention) and Analysis 8 (relationship between HRIS-enabled HR traditional management practices such as performance management, rewards, career development and communication, and HRM performance that is measured by overall employee involvement, trust, commitment and social climate between workers and management) are +0.505 and +0.490 respectively. These two values are positively significant at 0.01 level, therefore, can be considered as larger than typical in the strength of relationship.

Therefore, based on the overall results of these four analyses, the null hypothesis H_{2o} can be rejected, thus the alternative hypothesis H_2 is accepted.

Conclusion for Hypothesis 3 (H3):

Finally, for the third group, the HRIS-enabled HR transformational practices compared to HRM performance, the association results were both typical. Recall, the strength of relationship for 'r' family values are measured from 0.0 to ± 1.0 .

The strength of relationship for Analysis 9 (relationship between HRIS-enabled HR transformational management practices such as strategic planning, organizational development, knowledge management and change management, and HRM performance that is measured by overall employee satisfaction, motivation, presence and retention) and Analysis 10 (relationship between HRIS-enabled HR transformational management practices such as strategic planning, organizational development, knowledge management and change management, and HRM performance that is measured by overall employee involvement, trust, commitment and social climate between workers and management) are +0.406 and +0.436 respectively. These two values are positively significant at 0.01 level, therefore, can be considered as typical in the strength of relationship.

Therefore, based on the overall results of these two analyses, the null hypothesis H_{3o} can be rejected, thus the alternative hypothesis H_3 is accepted.

11.3.2 Overall conclusion for Research Question 1

In summary, based on the ten analyses above, the majority of the analyses, *i.e.* eight analyses, confirmed that HRIS-enabled HR practices significantly impact the HRM Performance with at

least the typical strength of relationship value. Specifically, the strength of values for Analysis 7 and 8, *i.e.* the relationship between HRIS-enabled HR traditional management practices such as performance management, rewards, career development and communication, and HRM performance, are larger than typical and positively significant at 0.01 level. Therefore, the important conclusion here is that while HRIS-enabled HR transactional and transformational practices along with HR traditional management practices such as recruitment, selection, training, promotion and compensation do significantly impact the HRM performance, this study confirms that HRIS-enabled HR traditional management practices such as performance management, rewards, career development and communication predominantly significantly impact the HRM performance.

11.4 Conclusion for Research Question 2

Continuing from above, recall research question 2 asks:

***RQ2:** Does the type of an organization significantly impacts the HRIS-enabled HRM performance?*

The hypothesis generated in this thesis are the following:

- **Null Hypothesis 4 (H4₀):** Organization type does not significantly impact the HRIS-enabled HRM performance model.
 - **Alternative Hypothesis 4 (H4):** Organization type significantly impacts the HRIS-enabled HRM performance model.

The variables used to test this hypothesis are divided into two types; the predictor (independent) variable, namely organization type, and the dependent variables, namely (a) HRIS-enabled HR transactional practices, (b) HRIS-enabled HR traditional practices, and (c) HRIS-enabled HR transformational practices.

11.4.1 Conclusion for Hypotheses 4

Using a cumulative odds OLR with proportional odds, the overall conclusion for Organization type versus HRIS-enabled HR practices is that the organizational type has no statistically significant effect on HRIS-enabled HR practices. Further analysis and discussion of these data can be found in Chapter 10. Based on the analysis for organization type versus HRIS-enabled

HR performance, the organizational type also has no statistically significant effect on HRIS-enabled human resources HRM performance.

Every analysis run based on organizational type and impacts on the HRIS-enabled HR practices and HRM performance showed no statistically significant effect. Consequently, the null-hypothesis can be accepted, thus the alternative hypothesis is rejected.

11.5 Conclusion for Research Question 3

Recall research question 3 asks:

***RQ3:** Does the size of an organization significantly impacts the HRIS-enabled HRM performance?*

The hypothesis generated in this thesis are the following:

- **Null Hypothesis 5 (H5₀):** Organization size does not significantly impact the HRIS-enabled HRM performance model.
 - **Alternative Hypothesis 5 (H5):** Organization size significantly impacts the HRIS-enabled HRM performance model.

The variables used to test this hypothesis are divided into two types; the predictor (independent) variable, namely organization size, and the dependent variables, namely (a) HRIS-enabled HR transactional practices, (b) HRIS-enabled HR traditional practices, and (c) HRIS-enabled HR transformational practices.

11.5.1 Conclusion for Hypotheses 5

Using a cumulative odds ordinal logistic regression with proportional odds, the overall conclusion for Organization size versus HRIS-enabled HR practices is that the organization size has no statistically significant effect on HRIS-enabled HR practices. Nevertheless, there is a data outlier in Analysis 2 (Impacts of organization size on HRIS-enabled HR transactional employee benefits administration practices).

Based on the analysis for Organization size versus HRIS-enabled HRM performance, the organization size has no statistically significant effect on HRIS-enabled HRM performance. However, there is a data outlier in Analysis 6 (Impacts of organization size on HRIS-enabled day-to-day HR transactional record keeping practices and HRM performance).

In the opinion of this researcher, these two anomalies (*i.e.* Analysis 2 and 6) can be said to be a result of one or more of the following reasons outlined by Check and Schutt (2012, p.162):

a) ***Respondent Characteristics:*** *Characteristics of respondents may produce inaccurate answers. These include:*

- ***Memory recall problems*** - remembering events or details about events.
- ***Telescoping remembering*** - events as happening more recently than when they really occurred.
- ***Agreement or acquiescence*** - bias tendency for respondents to “agree.”
- ***Social desirability tendency*** - to want to appear in a positive light and therefore providing the desirable response.
- ***Floater respondents*** - who choose a substantive answer when they really do not know.
- ***Fence-sitters people*** - who see themselves as being neutral so as not to give the wrong answer.

b) ***Presentation of questions:*** *The structure of questions and the survey instrument may produce errors including:*

- ***Closed-ended questions*** - Possible response categories are provided.
- ***Question order*** - the context or order of questions can affect subsequent responses as respondents try to remain consistent.
- ***Response set*** - giving the same response to a series of questions.
- ***Filter questions*** - questions used to determine if other questions are relevant.

Consequently, taking the lead from the majority, since thirteen analyses out of fifteen suggest that the organization size has no statistically significant effect on HRIS-enabled HRM performance, the null-hypothesis can be accepted thus the alternative hypothesis is rejected.

11.6 Limitations of this study and recommendations for future work

The outcome of this research are based on the analysis of data collected from a cross-sectional survey. Since the cross-sectional study designs are considered to be one of the known research methodologies for laying foundations for decisions about future follow-up studies (Teti, 2006), the outcome of this study, therefore, opens up new avenues for future researchers who are interested in conducting studies in the area of ICT and BPM relationship. Because of the relationship between the limitations for this thesis and recommendation for future works, both are presented together.

In general, this study can be considered a comprehensive research that is one of the first to look at the ICT and BPM performance relationship through the HRIS and BPM performance perspective. However, there are number of limitations in this study that should be considered as potential avenues for further studies in this area.

Based on the identified limitations the recommendations are given below:

Limitation 1: Context

This study is limited to Canadian context, thus the outcome of this study may not be generalized to the corresponding populations in other geographical settings.

Recommendation 1:

Since the outcome of this research can be considered to be a comprehensive model, future researchers may adopt this model to test the HRIS, HR practices and HRM performance relationship in a wider or alternate geographical setting. In other words, it is recommended that, instead of just considering one country (*i.e.* in this case Canada only), like Lee *et al.* (2012) did in their research, conducting a multi-country study to gather data sets may lead to a more comparative analysis that could include different cultural, social, political and economic settings.

Limitation 2: Study Focus

From the management standpoint, the aspects of BPM can be considered to be broad and wide. That said, since the focus of this study is narrowed down to HRIS, HR practices and HRM performance relationship, due to the fundamental differences such as purpose and functionality,

direct translation of the outcome of this study to the other sub-domains of BPM and ICT systems may not be appropriate.

Recommendation 2:

To study the other sub-domains of BPM and ICT systems, future researcher may adopt the model developed in this research with new set of constructs pertinent to that BPM-ICT sub domains.

Limitation 3: Constructs

As informed by Kavanagh, *et al.*, (2012), in this research the HR practices were grouped into three categories, namely HR transactional, traditional and transformational practices. However, as discussed in Chapter 3 of this thesis, the literature informs many other categorizations of HR practices. Therefore, the three HR practices constructs in this study can be challenged with other categorizations of HR practices.

Recommendation 3:

Researchers who wish to study the same model may be interested in redefining the HR practices constructs with other categorizations of HR practices.

Limitation 4: Control Variables

While the Paauwe and Richardson (1997) model suggested many control variables such as organization age, type, capital intensity, degree of unionization *etc.*, to keep the research within the manageable time frame, this study adopted only organization type and size as its control variables. Therefore, the impact of other control variables suggested by Paauwe and Richardson (1997) on the HRIS-enabled HRM performance model (*i.e.* the model conceptualized in this research) may not be ruled out.

Recommendation 4:

By accommodating other control variables (including or excluding organization age and type that have already been considered in this research) future researchers can refine the model.

Limitation 5: Sample and sample size

The samples of this study are selected from the list of HR professionals provided by ProspectCloud, a third party business data provider. The list provided 452 valid samples. However, a broader sample selection criteria such as obtaining the list directly from HR professional association (HRPA) in Canada would have provided a larger and accurate samples to this research. (Recall, as stated in Chapter 6, due to the large payment involved in obtaining the contact list of HRPA members, this option was not selected).

Recommendation 5:

Larger the sample size better the population representation (Bryman and Bell, 2007), therefore, acquiring larger sample size to re-test this model may improve the outcome.

Limitation 6: Additional Research Methods

This study is a cross-sectional study that employed a survey to gather data from more than one case within a short period of time. While considering that this methodology has already produced credible results, the researcher also of the opinion that employing additional research methods such a case studies and focus group studies within selected industries may yield industry-focused results that can strengthen the outcome of this study.

Recommendation 6:

As an extension to this research, this researcher or any other researchers who are interested, may conduct industry-focused longitudinal research studies to produce results that could help the organizations that seek improvement in their ICT-enabled business processes.

11.7 Contribution to knowledge

This study created an awareness of the contribution of ICT on BPM by analyzing the linkage between impacts of HRIS on HRM performance. While the organization type and size, the control variables in this study, do not add any value to the research findings, the important findings of this study is that HRIS-enabled HR transactional, traditional and transformational practices, when implemented appropriately, significantly impact the HRM performance. Specifically, this study confirms that HRIS-enabled HR traditional management practices such as performance management, rewards, career development and communication predominantly significantly impact the HRM performance. That is, the strength of relationship value is larger than typical between the aforementioned HRIS-enabled HR traditional practices and HRM performance. In other words, this study specifically encourages the organization to adopt

comprehensive performance management systems (PMS), as an important component of HRIS, to manage their employees effectively. In support of this finding, Aguinis (2013, p.8) maintains that:

“A study conducted by Development Dimensions International (DDI), a global human resources consulting firm specializing in leadership and selection, found that performance management systems are a key tool that organizations use to translate business strategy into business results. Specifically, performance management systems influence ‘financial performance, productivity, product or service quality, customer satisfaction, and employee job satisfaction’. In addition, 79% of the CEOs surveyed say that the performance management system implemented in their organizations drives the cultural strategies that maximize human assets”.

The findings of the studies in this thesis are applicable to organizations that seek improvement to their HRM performance through HRIS-enabled HR practices. Therefore, the organizations that intend to revisit and revamp their business processes related HRM are hereby informed by this study that adopting an appropriate HRIS, specifically a performance management system (PMS) will be the key to their success.

11.8 Thesis conclusion

Based on the research conducted during this investigation, this study confirms that HRIS-enabled HR traditional management practices such as performance management, rewards, career development and communication predominantly significantly impact the HRM performance. Therefore, this study specifically encourages the organization to adopt comprehensive performance management systems (PMS), as an important component of HRIS, to manage their employees effectively. While no significant impacts the HRIS-enabled HRM performance model were found based on organization size or type, further study looking more specifically at these areas is recommended.

Other recommendations include; using the testing model developed for this study to test the HRIS, HR practices and HRM performance relationship in a wider or alternate geographical setting (i.e. multi-country settings), adopting the model developed in this research with new set of constructs pertinent to that BPM-ICT sub domains, and using the same model but redefining the HR practices constructs with other categorizations of HR practices. Additionally, repeating the same study with a greater sample size and conducting industry-focused longitudinal

research studies to produce results that could help the organizations that seek improvement in their ICT-enabled business processes.

This research created an awareness of the contribution of ICT on BPM by analyzing the linkage between impacts of HRIS on HRM performance. The conclusions from this study are applicable to organizations that seek to improve their HRM performance through HRIS-enabled HR practices.

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Appendix A

A checklist of questions for designing a survey method (supplied by Creswell, 2003, p.155)

a)	Is the purpose of the survey design stated?	
b)	Are the reasons for choosing the design mentioned?	
c)	Is the nature of the survey (cross-sectional or longitudinal) identified?	
d)	Are the population and size of the population mentioned?	
e)	Will the population be stratified? If so, how?	
f)	How many people will be in the sample? On what basis was the size chosen?	
g)	What will be the procedure for sampling these individuals (<i>e.g.</i> random, non-random)?	
h)	What instrument will be used in the survey? Who developed the instrument?	
i)	What are the content areas addressed in the survey? The scales?	
j)	What procedure will be used to pilot or field test the survey?	
k)	What is the time line for administering the survey?	
l)	What are the variables in the study?	
m)	How do these variables cross-reference with the research questions and items on the survey?	
n)	What specific steps will be taken in data analysis to	
	i. analyze return?	
	ii. check the response bias?	
	iii. conduct a descriptive analysis?	
	iv. collapse items into scales?	
	v. check for reliability of scales?	
	vi. run inferential statistics to answer the research questions?	

Appendix B

Survey Questionnaire

Section 1: Survey Eligibility

- i. Are you a HR Professional?
 - a. 'Yes' → Continue the survey
 - b. 'No' → End of Survey
- ii. Are you employed in Canada or operating from Canada?
 - a. 'Yes' → Continue the survey
 - b. 'No' → End of Survey
- iii. Do you have a Human Resources Information System (HRIS) implemented and functioning within your organization?
 - c. 'Yes' → Continue the survey
 - d. 'No' → End of Survey

Hint: A Human Resource Management Systems (HRIS) comprises the information technology and processes in conducting contemporary human resource management. This might include some or all of the following capabilities: Applicant Tracking, Recruitment, Employee Information, Benefits Administration, Benefits Online Enrollment, Employee Training Records, Employee Self Service, Employee Manager Self Service, Performance Reviews and Compensation, Reporting, Payroll, Time and Attendance, Position Control, Government Compliance Issues, Career Development and Communication (employee relations), Strategic Planning, Organizational Development, Knowledge Management, and Change Management. Few Known HRIS: Peoplesoft, Ascentis, TimeForce, iRecruit, Kronos, HRSofts, HealthcareSource, etc.

Section 2: Personal and Company Background (Anonymity strictly maintained)

- iv. What is your position/title?
 - a. Sr. Vice President (SVP) – HR
 - b. Vice President (VP) – HR
 - c. Assistant Vice President (AVP) - HR
 - d. Director – HR
 - e. Sr. Manager – HR
 - f. Manager – HR
 - g. Consultant - HR
 - h. Coordinator - HR
 - i. Analyst - HR
 - j. Other (Please specify)

- v. Size: How many people are employed by your company?
 - a. Less than 500
 - b. Between 500 and 5000
 - c. More than 5000
- vi. In what province or territory is your main office (head office) for Canadian operations located?
 - a. Alberta
 - b. British Columbia
 - c. Manitoba
 - d. New Brunswick
 - e. Newfoundland and Labrador
 - f. Northwest Territories
 - g. Nova Scotia
 - h. Nunavut
 - i. Ontario
 - j. Prince Edward Island
 - k. Quebec
 - l. Saskatchewan
 - m. Yukon
- vii. How many branches (work locations) does your HRIS support?
 - a. 1
 - b. Between 2 and 10
 - c. More than 10
- viii. Industry Classification: In which industry is your business involved? (choose all that apply)
 - a. Agriculture, forestry, fishing and hunting
 - b. Mining, quarrying, and oil and gas extraction
 - c. Utilities
 - d. Construction
 - e. Manufacturing
 - f. Wholesale trade
 - g. Retail trade
 - h. Transportation and warehousing
 - i. Information and cultural industries
 - j. Finance and insurance
 - k. Real estate and rental and leasing
 - l. Professional, scientific and technical services
 - m. Management of companies and enterprises
 - n. Administrative and support, waste management and remediation services
 - o. Educational services
 - p. Health care and social assistance
 - q. Arts, entertainment and recreation
 - r. Accommodation and food services
 - s. Other services (except public administration)

- t. Public administration
- u. Other (please specify)
- ix. Type of (your) organization:
 - a. Government
 - b. Non-Government (NGO)
 - c. Semi-Government
 - d. Private

Hypotheses Testing

Note:

- Please select ONLY ONE AND MOST APPROPRIATE answer to the questions below (from 11 to 25) based on the HRIS system that is currently implemented and functioning within your organization.
- Even though the questions look similar to each other in format, in reality they are not. Please pay careful attention to each question as they are completely different in nature.

Section 3: HRIS – HR Practices Relationship

1. The implementation of the HRIS has improved overall **employee day-to-day record keeping activities** such as entering payroll information, employee status changes, *etc.*:
 - a. Strongly agree
 - b. Agree
 - c. Neither agree nor disagree
 - d. Disagree
 - e. Strongly disagree
 - f. These activities are NOT supported by the current HRIS in my organization
2. The implementation of the HRIS has improved overall **employee benefits administration activities** such as overseeing the health insurance coverage, administering investment and retirement program, *etc.*:
 - a. Strongly agree
 - b. Agree
 - c. Neither agree nor disagree
 - d. Disagree
 - e. Strongly disagree
 - f. These activities are NOT supported by the current HRIS in my organization
3. The implementation of the HRIS has improved overall management activities related to employee recruitment, selection, training, promotion, and compensation:
 - a. Strongly agree
 - b. Agree
 - c. Neither agree nor disagree
 - d. Disagree
 - e. Strongly disagree
 - f. These activities are NOT supported by the current HRIS in my organization

4. The implementation of the HRIS has improved overall employee management activities related to employee performance management, rewards, career development and communication (employee relations):
 - a. Strongly agree
 - b. Agree
 - c. Neither agree nor disagree
 - d. Disagree
 - e. Strongly disagree
 - f. These activities are NOT supported by the current HRIS in my organization
5. The implementation of the HRIS has improved overall employee management activities that meet strategic organizational objectives such as strategic planning, organizational development, knowledge management and change management:
 - a. Strongly agree
 - b. Agree
 - c. Neither agree nor disagree
 - d. Disagree
 - e. Strongly disagree
 - f. These activities are NOT supported by the current HRIS in my organization

Section 4: HRIS – HR Practices – HR Performance Relationship

6. The day-to-day record keeping activities, such as entering payroll information, employee status changes, *etc.*, that are supported by the HRIS have contributed to the improvement of overall employee satisfaction, motivation, presence (obverse of absenteeism) and retention (obverse of turnover):
 - a. Strongly agree
 - b. Agree
 - c. Neither agree nor disagree
 - d. Disagree
 - e. Strongly disagree
 - f. These activities are NOT supported by the current HRIS in my organization
7. The day-to-day record keeping activities, such as entering payroll information, employee status changes, *etc.*, that are supported by the HRIS have contributed to the improvement of overall employee involvement, trust, loyalty, commitment and “social climate” between workers and management:
 - a. Strongly agree
 - b. Agree
 - c. Neither agree nor disagree
 - d. Disagree
 - e. Strongly disagree
 - f. These activities are NOT supported by the current HRIS in my organization

8. The benefits administration activities, such as administering health insurance coverage, investments, retirement programs, *etc.*, that are supported by the HRIS have contributed to the improvement of overall employee satisfaction, motivation, presence (obverse of absenteeism) and retention (obverse of turnover):
 - a. Strongly agree
 - b. Agree
 - c. Neither agree nor disagree
 - d. Disagree
 - e. Strongly disagree
 - f. These activities are NOT supported by the current HRIS in my organization
9. The benefits administration activities, such as administering health insurance coverage, investments, retirement programs, *etc.*, that are supported by the HRIS have contributed to the improvement of overall employee involvement, trust, loyalty, commitment and “social climate” between workers and management:
 - a. Strongly agree
 - b. Agree
 - c. Neither agree nor disagree
 - d. Disagree
 - e. Strongly disagree
 - f. These activities are NOT supported by the current HRIS in my organization
10. The management activities of employee recruitment, selection, training, promotion, and compensation that are supported by the HRIS have contributed to the improvement of overall employee satisfaction, motivation, presence (obverse of absenteeism) and retention (obverse of turnover):
 - a. Strongly agree
 - b. Agree
 - c. Neither agree nor disagree
 - d. Disagree
 - e. Strongly disagree
 - f. These activities are NOT supported by the current HRIS in my organization
11. The management activities of employee recruitment, selection, training, promotion, and compensation that are supported by the HRIS have contributed to the improvement of overall employee involvement, trust, loyalty, commitment and “social climate” between workers and management:
 - a. Strongly agree
 - b. Agree
 - c. Neither agree nor disagree
 - d. Disagree
 - e. Strongly disagree
 - f. These activities are NOT supported by the current HRIS in my organization

12. The management activities of employee performance management, rewards, career development and communication (employee relations) that are supported by the HRIS have contributed to the improvement of overall employee satisfaction, motivation, presence (obverse of absenteeism) and retention (obverse of turnover):
- Strongly agree
 - Agree
 - Neither agree nor disagree
 - Disagree
 - Strongly disagree
 - These activities are NOT supported by the current HRIS in my organization
13. The management activities of employee performance management, rewards, career development and communication (employee relations) that are supported by the HRIS have contributed to the improvement of overall employee involvement, trust, loyalty, commitment and “social climate” between workers and management:
- Strongly agree
 - Agree
 - Neither agree nor disagree
 - Disagree
 - Strongly disagree
 - These activities are NOT supported by the current HRIS in my organization
14. The activities that meet strategic organizational objectives, such as strategic planning, organizational development, knowledge management, change management, *etc.*, that are supported by the HRIS have contributed to the improvement of overall employee satisfaction, motivation, presence (obverse of absenteeism) and retention (obverse of turnover):
- Strongly agree
 - Agree
 - Neither agree nor disagree
 - Disagree
 - Strongly disagree
 - These activities are NOT supported by the current HRIS in my organization
15. The activities that meet strategic organizational objectives, such as strategic planning, organizational development, knowledge management, change management, *etc.*, that are supported by the HRIS have contributed to the improvement of overall employee involvement, trust, loyalty, commitment and “social climate” between workers and management:
- Strongly agree
 - Agree
 - Neither agree nor disagree
 - Disagree
 - Strongly disagree
 - These activities are NOT supported by the current HRIS in my organization

Appendix C

Codebook (Variables in the IBM-SPSS working file)

Variable Information								
Variable	Position	Label	Measurement Level	Role	Column Width	Alignment	Print Format	Write Format
org_type	1	Org. Type	Nominal	None	16	Right	F23.2	F23.2
org_size	2	Org. Size	Nominal	None	15	Right	F23.2	F23.2
Q1	3	HRIS-Transactional (Day2Day)	Ordinal	None	12	Right	F23.2	F23.2
Q2	4	HRIS-Transactional (Benefit Admin)	Ordinal	None	12	Right	F23.2	F23.2
Q3	5	HRIS-Traditional (Rec.Select.Train.Promo. Comp.etc.)	Ordinal	None	12	Right	F23.2	F23.2
Q4	6	HRIS-Traditional (Perform_Mgmt.Reward. Career_Dev.etc.)	Ordinal	None	12	Right	F23.2	F23.2
Q5	7	HRIS-Transformational (Strategic_Plan.Org_Dev.Know_Mgmt.Change_Mgmt.)	Ordinal	None	12	Right	F23.2	F23.2
Q6	8	HR-enabled Transactional-HR Performance (Day2Day-Satis.Motivation.Presense. Retention)	Ordinal	None	12	Right	F23.2	F23.2
Q7	9	HR-enabled Transactional-HR Performance (Day2Day-Invole.Trust.Loyal.commit.)	Ordinal	None	12	Right	F23.2	F23.2
Q8	10	HR-enabled Transactional-HR Performance (Benefit Admin-Satis.Motivation.Presense. Retention)	Ordinal	None	12	Right	F23.2	F23.2
Q9	11	HR-enabled Transactional-HR Performance (Benefit Admin-Invole.Trust.Loyal.commit.)	Ordinal	None	12	Right	F23.2	F23.2
Q10	12	HR-enabled Traditional-HR Performance (Day2Day-Satis.Motivation.Presense. Retention)	Ordinal	None	12	Right	F23.2	F23.2
Q11	13	HR-enabled Traditional-HR Performance (Day2Day-Invole.Trust.Loyal.commit.)	Ordinal	None	12	Right	F23.2	F23.2
Q12	14	HR-enabled Traditional-HR Performance (Benefit Admin-Satis.Motivation.Presense. Retention)	Ordinal	None	12	Right	F23.2	F23.2
Q13	15	HR-enabled Traditional-HR Performance (Benefit Admin-Invole.Trust.Loyal.commit.)	Ordinal	None	12	Right	F23.2	F23.2
Q14	16	HR-enabled Transformational-HR Performance (Transformational-Satis.Motivation.Presense. Retention)	Ordinal	None	12	Right	F23.2	F23.2
Q15	17	HR-enabled Transformational-HR Performance (Transformational-Invole.Trust.Loyal.commit.)	Ordinal	None	12	Right	F23.2	F23.2

Variable Values

Value		Label
org_type	1.00	Private
	2.00	Government
	3.00	Semi-Government
	4.00	Non-Government (NGO)
org_size	1.00	Less than 500
	2.00	Between 500 and 5000
	3.00	More than 5000
Q1	.00	Strongly disagree
	1.00	Disagree
	2.00	Neutral
	3.00	Agree
	4.00	Strongly agree
Q2	.00	Strongly disagree
	1.00	Disagree
	2.00	Neutral
	3.00	Agree
Q3	.00	Strongly disagree
	1.00	Disagree
	2.00	Neutral
	3.00	Agree
Q4	.00	Strongly disagree
	1.00	Disagree
	2.00	Neutral
	3.00	Agree
Q5	.00	Strongly disagree
	1.00	Disagree
	2.00	Neutral
	3.00	Agree
Q6	.00	Strongly disagree
	1.00	Disagree
	2.00	Neutral
	3.00	Agree
Q7	.00	Strongly disagree
	1.00	Disagree
	2.00	Neutral
	3.00	Agree
Q8	.00	Strongly disagree
	1.00	Disagree
	2.00	Neutral
	3.00	Agree
Q9	.00	Strongly disagree
	1.00	Disagree
	2.00	Neutral
	3.00	Agree
Q10	.00	Strongly disagree
	1.00	Disagree
	2.00	Neutral
	3.00	Agree
Q11	.00	Strongly disagree
	1.00	Disagree
	2.00	Neutral
	3.00	Agree
Q12	.00	Strongly disagree
	1.00	Disagree
	2.00	Neutral
	3.00	Agree
Q13	.00	Strongly disagree
	1.00	Disagree
	2.00	Neutral
	3.00	Agree
Q14	.00	Strongly disagree
	1.00	Disagree
	2.00	Neutral
	3.00	Agree
Q15	.00	Strongly disagree
	1.00	Disagree
	2.00	Neutral
	3.00	Agree

Variable Values

Value		Label
Q8	.00	Strongly disagree
	1.00	Disagree
	2.00	Neutral
	3.00	Agree
	4.00	Strongly agree
Q9	.00	Strongly disagree
	1.00	Disagree
	2.00	Neutral
	3.00	Agree
	4.00	Strongly agree
Q10	.00	Strongly disagree
	1.00	Disagree
	2.00	Neutral
	3.00	Agree
	4.00	Strongly agree
Q11	.00	Strongly disagree
	1.00	Disagree
	2.00	Neutral
	3.00	Agree
	4.00	Strongly agree
Q12	.00	Strongly disagree
	1.00	Disagree
	2.00	Neutral
	3.00	Agree
	4.00	Strongly agree
Q13	.00	Strongly disagree
	1.00	Disagree
	2.00	Neutral
	3.00	Agree
	4.00	Strongly agree
Q14	.00	Strongly disagree
	1.00	Disagree
	2.00	Neutral
	3.00	Agree
	4.00	Strongly agree
Q15	.00	Strongly disagree
	1.00	Disagree
	2.00	Neutral
	3.00	Agree
	4.00	Strongly agree

Appendix D

Affidavit from Prospect Cloud



18 DIVISION STREET SUITE#301
SARATOGA SPRINGS, NY 12866

November 6, 2103

Dear Sinnathamby Sritharakumar (Sathy),

Below is an outline of our sourcing and quality process intended to support your vetting of the lists purchased from ProspectCloud.

Part 1

Sourcing: Contacts have been sourced from D&B, Hoovers and Salesforce. All of these sources are internationally recognized business directories with a strong presence of Human Resource professionals. All contacts are in HR roles within Canadian organizations, as defined in the List Insertion Order.

Part 2

ProspectCloud's Quality Process: Below is an outline of the steps taken to vet the contact list and remove bad contacts prior to delivery of the list. These measures typically result in 95% or greater email accuracy.

1. Purging of personal email addresses. List includes only direct email address for the HR decision maker at the place of business.
2. Purging of generic/role email addresses. List does not contain any personal email addresses that are not practical to vet, or that may be outside of a Canadian business environment.
3. Mail Exchange Verification. An electronic process to verify the mail exchange of the organization, and the first step in cleansing of inactive email addresses.
4. Username/Email Verification. A proprietary process to test email addresses for validity following the Mail Exchange Verification, and identify failures.
5. Bounce Removal. Email contacts flagged as bad are removed from the contact list.
6. Deliverability testing. Prior to delivery, the list is randomized and a sample set representing 10% of the contact list is sent an email to test both deliverability and failure rates, and to ensure the list meets the 95% email deliverability guarantee.

Shall you have any questions, please feel free to contact your account executive at the locations noted below.

Sincerely,

Brad Segal

VP of Sales & Marketing
Direct: 518.621.4448
Email: bsegal@prospect-cloud.com

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